PUBLIC WORKS

May 1953

CITY, COUNTY AND STATE

etting 16,000 Water Meters in a Hurry

irinding Garbage Pays Its Way

treet Naming and House Numbering

)oing a Better Job of Street Patching

:onstruction Equipment for a Water Department

Ieat-Treating Garbage—Equipment & Methods

Vhat About Water Use And Water Shortages?

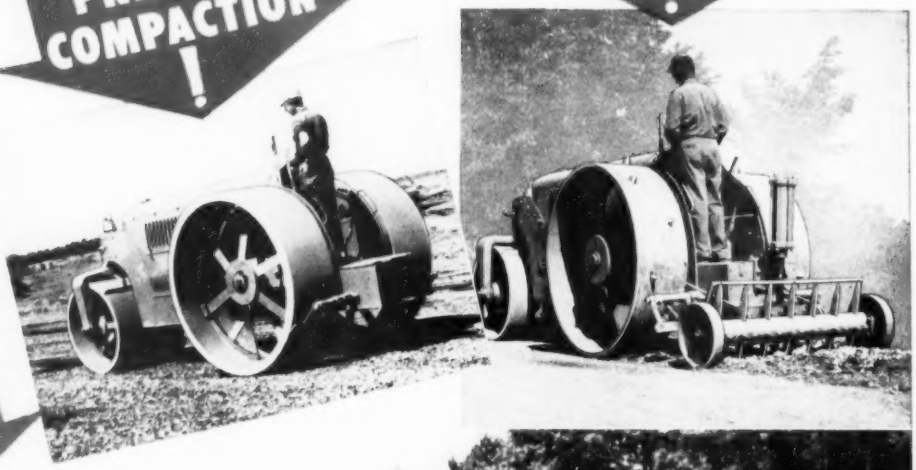
Thomas J. Skinker is Water Commissioner of St. Louis, Mo. Starting as a levelman, he is now in charge of a $20,000,000 program. More on page 24.

GALION 3-WHEEL ROLLER

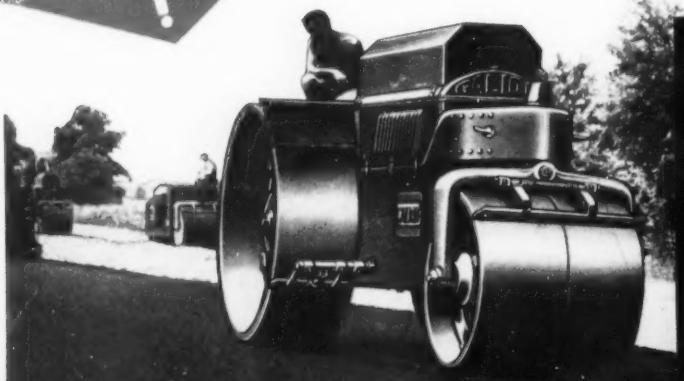
- for Triple Service

PRIMARY COMPACTION !

SCARIFYING !



FINISH ROLLING !



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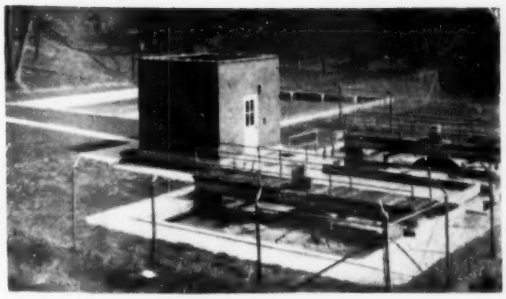

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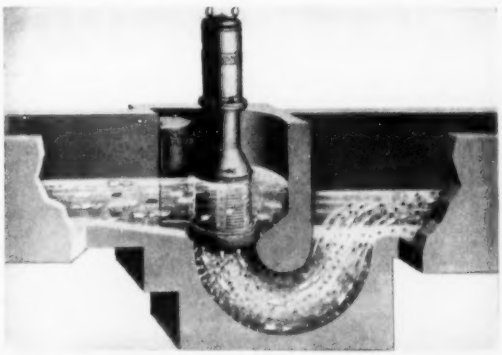

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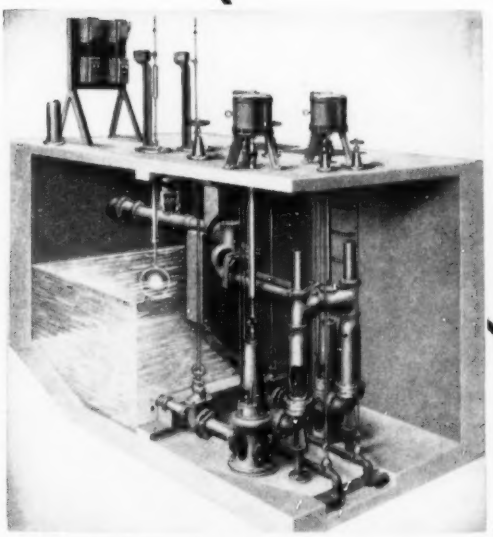

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The proven clog-proof pump for handling raw sewage or liquids containing coarse or stringy matter. Incoming sewage flows through idle pumps. Incoming solids are retained on a screen. Screen is backwashed when pump starts — all solids are carried to discharge pipe. Pump handles only strained liquids.

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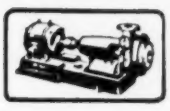
SEWAGE EQUIPMENT DIVISION



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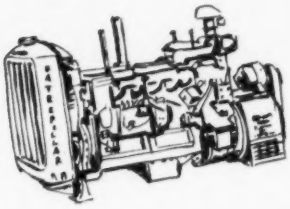

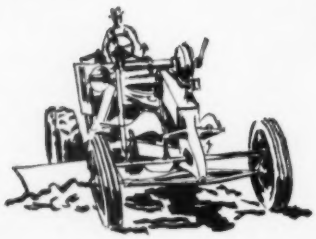

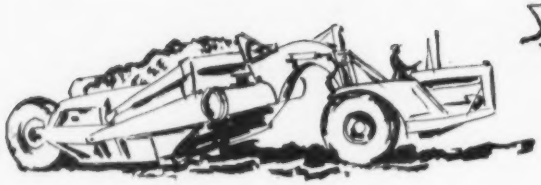

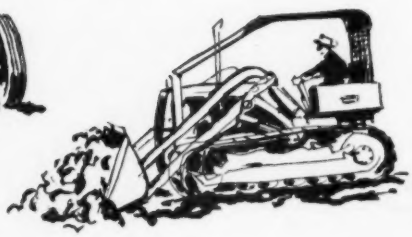

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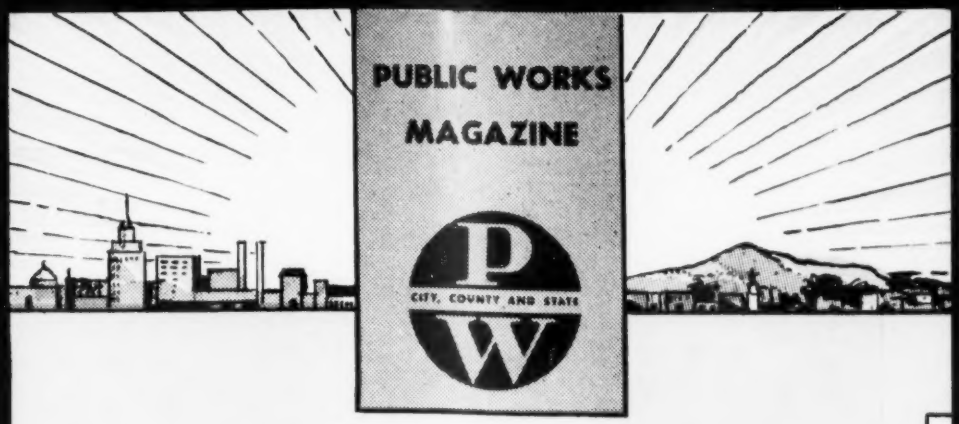

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THE MOST USEFUL ENGINEERING MAGAZINE FOR CITIES, COUNTIES AND STATES

How Are Natural Rubber Roads Standing Up?

A Progress Report

Since 1949, test roads incorporating natural rubber powder have been laid in 19 states in the U. S. Most of them are in excellent condition today and have required no maintenance. While it is still too early to say conclusively that natural rubber roads are the answer to America's tremendous highway problem, indications are that natural rubber powder added to asphalt can aid materially in stretching our highway dollars, by giving us roads that last longer and require less repair.

West Side Highway, **Borough of Manhattan, New York City** Laid, summer 1950, a 100' test section of natural rubber-asphalt pavement, with adjacent stretches of other types of rubber paving and a control section without rubber.

RESULTS: *After almost three years of traffic, rated at 60,000 vehicles per day, the natural rubber section has withstood the ravages of traffic and climate, and the Borough officials are well pleased with the results.*

Falls Road, **Baltimore, Maryland**

Laid, 1950, a test section with 1¼" binder course and 1" sheet asphalt top course, both containing natural rubber powder.

RESULTS: *After nearly three years of main artery traffic, both the natural rubber section and the control section are in first-class condition. The natural rubber section appears darker in color, indicating it has not lost as much of the lighter oil fractions of the asphalt cement through solar radiation.*

Route 11, **Montreal, Canada**

Laid, 1949. Control section (without rubber) was laid twice the thickness of the natural rubber test section. Traffic volume is up to 25,000 vehicles per day, with vehicles using tire chains during most of the winter.

RESULTS: *On the control section, chain markings appear to be permanent, and the surface has broken through in several spots. On the natural rubber section, chain indentations, which appear during the winter, are healed over and smoothed out during summer months, leaving no apparent damage to the surface.*

FREE SPECIFICATIONS AND ASSISTANCE

The facilities of the Natural Rubber Bureau Research Laboratory are available, without cost, to all highway engineers. If you would like to lay a test strip of natural rubber-asphalt paving, we invite you to write us. Our experienced highway engineers will supply you with free information and technical advice.

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THE EDITOR'S POINT OF VIEW

Water Conservation is Becoming Increasingly Important

REPORTED in this issue is a survey which indicates that nearly one-seventh of our cities have suffered from water shortages during the past two years. This fact points up the need for most careful consideration of broad-gauge plans for conserving our water supplies. Such a program should include intensification of our stream pollution abatement efforts; research into ground water supplies; studies on stream flow regulation; and other activities, including perhaps rainmaking.

Not all of the shortages reported have been due to lack of water; some of them have resulted from lack of means to convey the water to the consumer. This means that we need more and more sound water works construction, designed for the future, built of materials which will endure, and constructed in accordance with specifications representing the highest standards. Water supply is important to health, to industry and to prosperity; it deserves the best of engineering and construction.

Safety in Public Works Construction

THERE have been marked changes in the methods of public works construction during the past decade or two. Has safety in such construction kept pace with these changing conditions of doing the work? We do not know, but sometimes we question that it has. For instance, since practically all trenching is now done by machine instead of by large gangs of men, there could be a temptation to take a chance with the few men required briefly to lay the water or sewer pipe in the trench—a chance that would not be taken if there were twenty or thirty men in the trench. There would then have been no question about sheeting.

We believe that more study should be given to reducing the hazards of public works construction under present-day procedures. Perhaps new equipment for safety is needed, such as portable trench sheeting. We invite our readers to contribute articles telling what they have done to reduce accidents on the jobs they have directed or performed.

Good Public Relations Makes Friends for the Highway Department

SOME time ago a friend of ours asked us to ride from Boston to New Rochelle in his new Cadillac. This Cadillac has all the latest gadgets—push button window control, two-tone windshield, power steering, astronomical sized gas tank. About dusk on the Merritt Parkway the owner looked at the gas gauge and said, "We are out of gas." The Cadillac sighed and gave up the ghost. We were able to roll into an exit road. Then what to do? While we were deciding, a State patrol car came cruising along and stopped. The officer didn't demand our license but asked what was wrong. When we told him, he lifted the phone in his car and called a service station and said "Cadillac N. Y. License No. ——— at such and such location, out of gas." Then he told us the station man would come to us soon and went his way. In not over twenty minutes the service truck was there with two gallons of gas. The total cost, one dollar plus the cost of the gas.

That's the kind of service which makes friends for the highway department.

Better Tools for Better Highway Maintenance

SO important do we deem the use of equipment in highway maintenance that we have again published a series of articles by state highway engineers describing the problems that are being encountered and the equipment and methods of solving them.

Our highway needs cannot be met without a vast expansion of our road-building program; yet, the program of building cannot be permitted to lessen, to any degree, the skilled maintenance care that must be continually applied if our roads are to carry the traffic that now exists. The problem is to provide this skilled mainterance care with fewer and fewer men, and at lower and lower unit costs. There is only one way to do this, and that is by the wider employment of more effective equipment for still more kinds of work.

It is to this end that we asked many of our outstanding states to tell us what kind of equipment they are using for maintenance and what results they are getting with it. We believe that counties and cities, as well as states, will benefit from this knowledge and experience.

Turns Swamp Bottom

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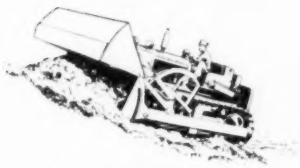
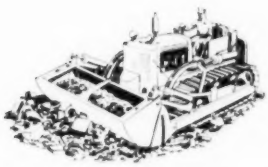
into Ball Park

Solves Municipal Problem for Neptune, New Jersey

ONE MAN UNIT



1. Prepares the site



2. Crushes and compacts refuse

3. Transports and spreads earth cover

4. Grades and levels finished area

Neptune, New Jersey, had 22 acres of swampy unclaimed land it wanted to reclaim. The surrounding towns, Asbury Park, Ocean Grove, Neptune City, Avon, and Belmar, had a lot of daily refuse they wanted to get rid of. So Neptune put those two wants together—came up with a modern sanitary fill.

Today, solid ground is rising from the swamp as 30 trucks haul refuse to the site, where an International Crawler with a Drott Bullclam takes over.

"*It works like magic,*" says Lester Herbert, street superintendent in charge of the fill, "*One minute you see that mountain of waste brought in by the trucks and the next time you look it's gone forever—smashed flat, leveled out, and buried beneath a layer of dirt.*

"*Soon what once was worthless bottomland will be a high, dry ball park. Our old, open dump is a thing of the past, along with its smells, its damage to dump-truck tires, and its fires so bad we had to call the fire department once a week to control them.*"

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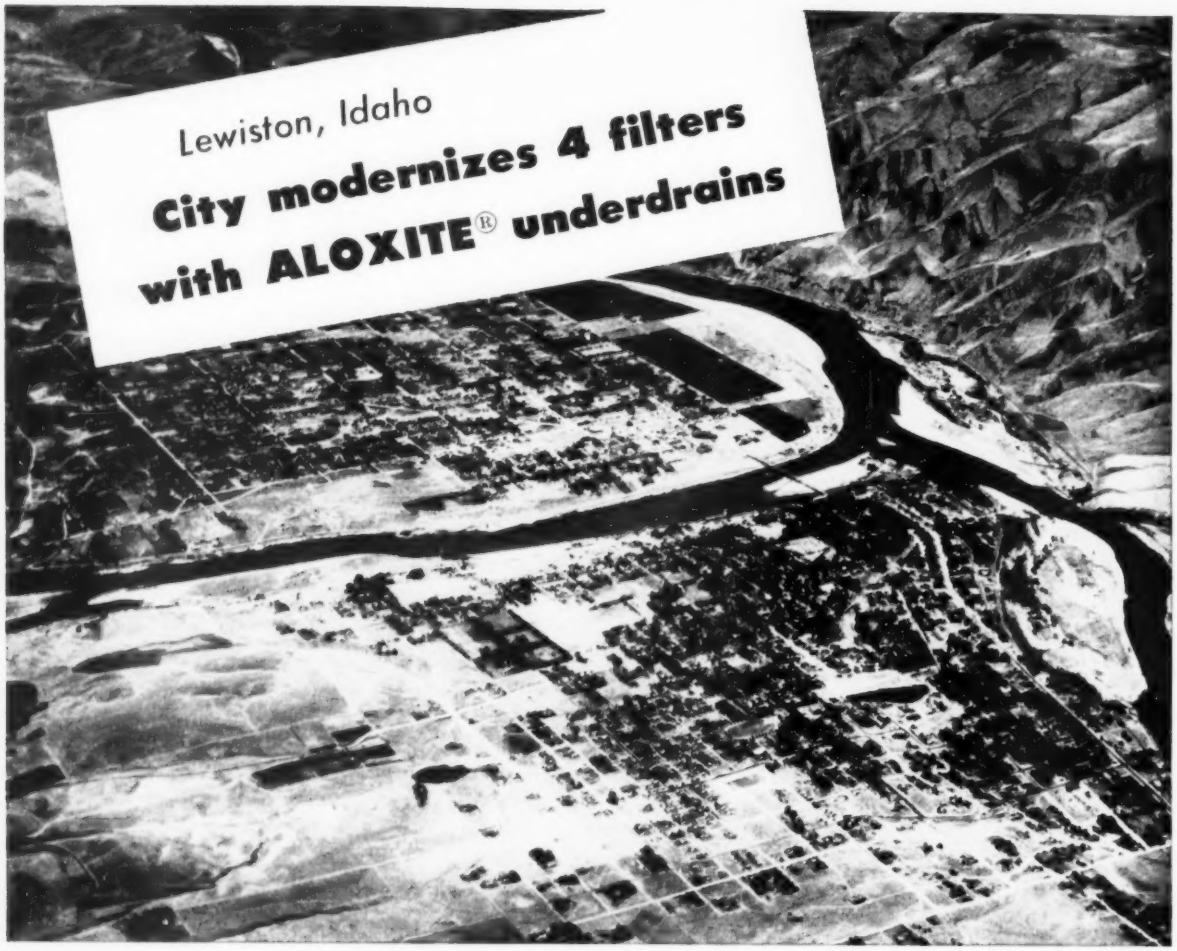

Information courtesy Lewiston Water Dept., Lewiston, Idaho. Photo shows Lewiston in the foreground and Clarkston, Washington in the background across the Interstate Bridge.

Lewiston, Idaho has four filters. Installed in 1924, these were originally of the conventional type with pipe lateral underdrains and graded gravel. First in 1934, and again in 1950 they required rebuilding. The beds were badly upset, the laterals clogged and corroded.

The last time the filters needed rebuilding, the Engineering Dept. decided to see if there were other, more stable types of underdrains. After investigating all systems, ALOXITE aluminum oxide porous plates were singled out as probably the best. One reason was that they seemed less difficult and less expensive to adapt to the old filter construction.

Letters were then sent to operators using these plates, inquiring as to their success in service. Many favorable replies were received, one all the way from Nykoping, Sweden—and, as a result, all four filters were modernized with ALOXITE porous-plate bottoms.

To quote from Lewiston's 1951 City Engineer's Annual Report: "(The new filters) have given the utmost satisfaction. They wash evenly and the initial loss of head is less than it was with the original construction."

Our congratulations to Lewiston on a thorough job of investigation, and a careful job of installation. We know the City will continue to be pleased with the low operating and maintenance costs of these porous-plate underdrains.

THE FULL LEWISTON STORY is described in a magazine article by W. H. Berkeley reprinted from the AWWA Journal. It tells of their experiences with graded gravel, pipe lateral bottoms, describes how they installed the porous plates, and outlines the benefits derived from the new underdrains. A copy of this article, together with a 56-page booklet on porous media, will be sent free of charge. Simply address: Dept. W-53, Refractories Div., The Carborundum Company, Perth Amboy, N. J. Both are very worth-while.

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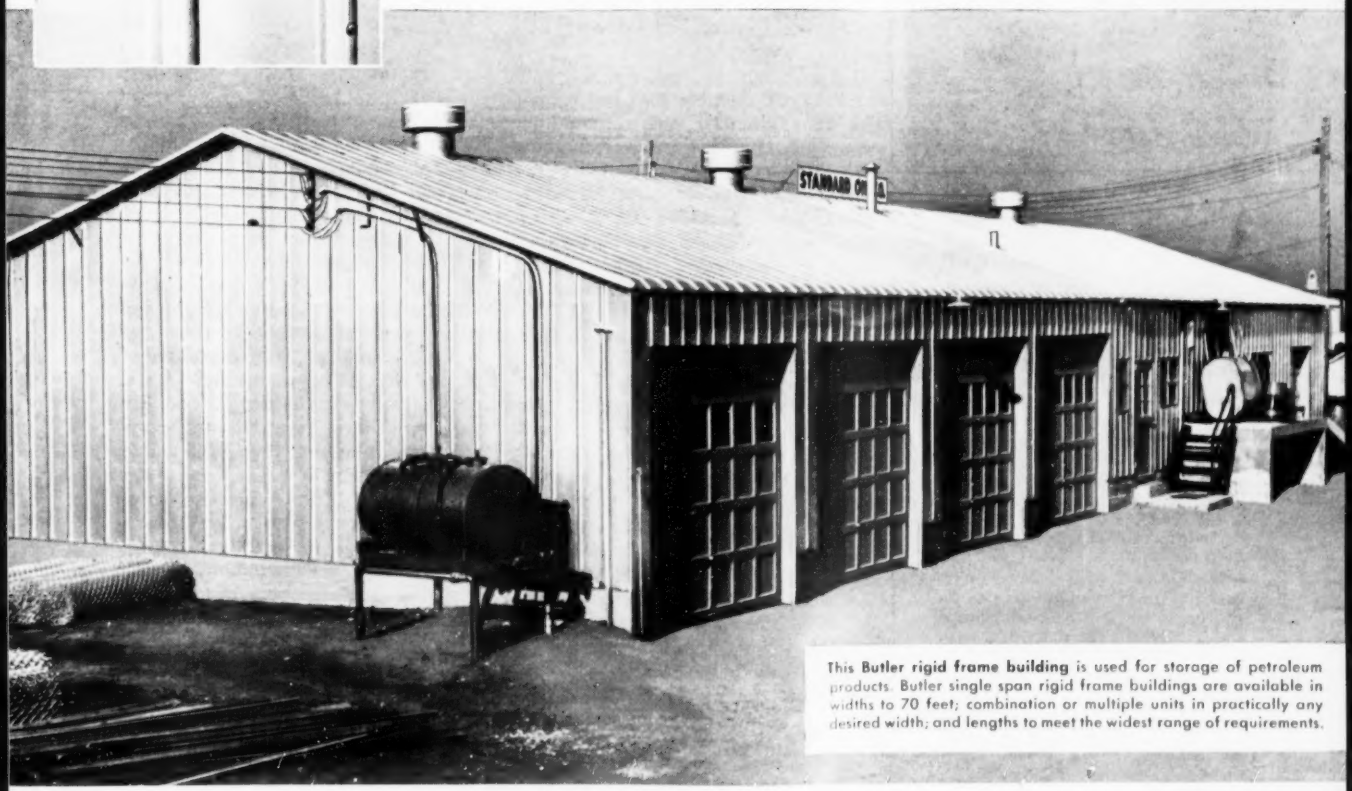

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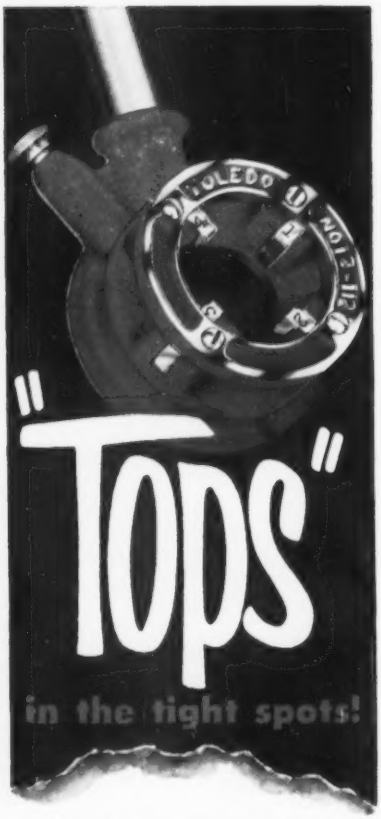

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RELY ON THE LEADER

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POWER DRIVES

People, Ideas and Events

BY "DOC" SYMONS

H. T. M. A. — And this is the month of the AWWA meeting in Grand Rapids, Mich. As I write this "epistle" I wonder what's in store.—The program looks good; John Stewart promises that the exhibits will be excellent; and I'll be the Committee has cooked up some good entertainment.

★ ★ ★

In mid-March, I journeyed down to Atlantic City to attend the annual meeting of the N. J. Sew. & Ind. Wastes Assn. (of which I'm proud to say, I'm a member.)—Good meeting; more than 400 there, including some 33 ladies. — The famous "Speechless Dinner" on Mar. 12, could well have been a birthday party, this year, for Ed Molitor, Supt. of the Madison-Chatham Joint Meeting Sewage Works; One B-Day present was a new necktie, decorated with the letters A.C.F. (one of the exhibitors).

★ ★ ★

I Read Somewhere — That Thos. H. Wiggin, N. Y. Cons. Engr., has moved his office. The item reminded me of our first meeting. It was at the Chicago AWWA Convention in 1933—I was looking for a job to try my new degree on. "Doc" Buswell introduced me to Colonel Wiggin, who was looking for a guide to the Century of Progress. I'd been there before so offered my services—hoping the Colonel might offer me a job. He didn't have one to offer, but we had a wonderful night at the Fair and have been friends since.

★ ★ ★

Luminous Quotes—"Progress based on new scientific data awaits the death of incumbents." — Quoted from Anonymous, by Al Fletcher, Dir., Bur. of Envr. Sanit., N. J. Dept. of Health.—And This—"If you need a thing, you're going to pay for it, whether you buy it or not."—Also quoted from Anonymous—by Art Akers, that fellow who has the last word Worth Telling in Public Works Magazine.

I See By The Papers — That Chicago has consolidated its Water and Sewer Departments, with W. W. DeBerard as Chief Water Engr. and Dep. Comm., and Hi Gerstein as Asst. Chief Water Engr. John Baylis continues as Water Works Engineer and Oscar Gullans moves into Hi's old job as Water Filtration Engineer at the South District Plant. —The Sewer Dept. organization doesn't have anything to do with the Chicago San. Dist. which operates the treatment plants.

That "Chuck" Gard is now one of the "Associates" in Alden E. Stilson and Associates in Columbus, Ohio.

That "Jack" Bethel is now a partner in Metcalf and Eddy, Cons. Engrs. in Boston.

★ ★ ★

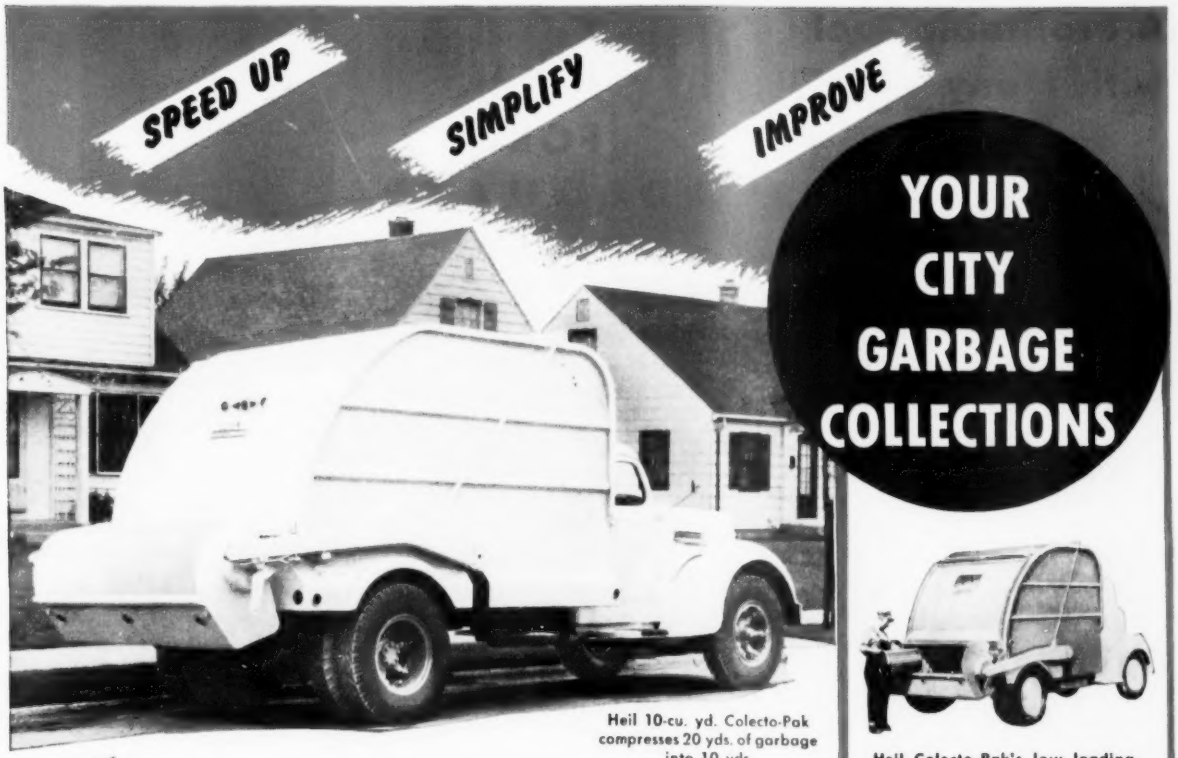
Thanks "Siggie"—Best known for his abilities as a purveyor of activated carbon—Nuchar variety—and as the perennial and well-nigh perfect Chairman of Transportation of all AWWA Conventions, one E. A. Sigworth has a hidden talent. He can, and does, compose and construct birthday greetings, like comic valentines.—Sent me a "beaut" on April Fool's Day.—When he says, "Let me be the first to. . ." he means it—by 19 days, in fact.

Sig said he was shaving one morning and happened to think about the AWWA Convention in Atlantic City some years back, when the entertainer asked me my birth date and then commented, "Same day as Hitler's".—Gosh, the things some people remember.—Anyway, Sig, thanks to you and your artist, A. J. Dimick.

★ ★ ★

Small World No. 19 — It was on the exhibit hall floor at the AWWA Kansas City Convention, last May.—I was talking with Betty (Mrs. Richard) Hazen and Louise (Mrs. Karl) Mann. Along came "Johnny" Horgan, Sales Mgr. of R. B. Carter Co., and after introductions, Johnny said

(*Continued on page* 133)

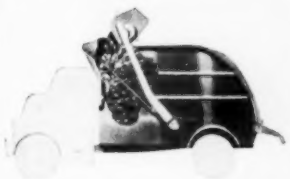


Heil 10-cu. yd. Colecto-Pak compresses 20 yds. of garbage into 10 yds.

HERE'S the fast, easy, *better* way to assure the best possible garbage collection service for your city. The Heil Colecto-Pak is totally enclosed to eliminate ugly sights and smells. It's watertight to prevent unsanitary dripping of liquified wastes. The hydraulically operated packer plate compresses the load to eliminate waste space . . . bigger loads mean fewer trips to the dump. Finger-tip operating controls, either in the cab or at the side of the body, make loading, packing and discharge simple and easy for inexperienced labor. Quick, clean final discharge of the well-packed load is assured by the famous Heil Twin-Arm Hoist that raises the tapered, easy-to-dump body to a 45° angle in 12 seconds.

Whether you need just one or a whole fleet of garbage collection units, be sure to investigate the Heil Colecto-Pak before you buy. Write today for a complete description of time and money-saving features.

Heil Colecto-Pak's low loading height makes it easy for your crews to handle refuse and garbage without exertion or spilling.



Cut-away view shows bucket dumping and packer plate in open position. As the bucket returns, the packer plate compresses the load.

With the bucket ready to receive another load, the packer plate is in closed position. Material is packed tightly into the rear of the body.

THE HEIL CO. GB-2

Dept. 4453, 3044 West Montana Street • Milwaukee 1, Wisconsin

Factories: Milwaukee, Wis.—Hillside, N. J.

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HEILINER SCRAPER TRACTOR DRAWN SCRAPERS CONVERSION HOIST CONTRACTOR'S BODY

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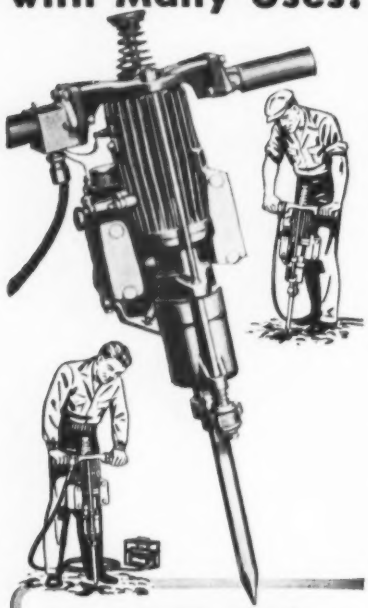
A Profitable Tool with Many Uses!



BARCO *Gasoline* **HAMMER**

■ HERE'S why owners of the *improved* Barco Gasoline Hammer are enthusiastically acclaiming it as *"A Profitable Tool With Many Uses!"*

- Versatile! Use it for Pavement Breaking . . . Cutting . . . Digging . . . Rock Drilling . . . Frost Breaking . . . Rod Driving. Ideal for general utility, standby, and emergency service.
- One man operation. No compressor needed. Easy to take to any location.
- New ignition system—quick, easy starting.
- Quick disconnect at handle for battery cable. Thumb controlled switch.
- Powerful, rugged; up to 1550 strokes per minute.
- Economical! Low first cost, low operating expense, low maintenance expense. *Quickly pays for itself.*

ASK FOR A DEMONSTRATION—See for yourself—ask for our nearest distributor to give you a demonstration.

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A Chicago Suburb

Ask For This New
BULLETIN 613

UP FRONT FOR ADEQUATE ROADS

BY
LEO J. RITTER, JR.
New York University

A. G. C. Resolution: The powerful Associated General Contractors of America, meeting in annual convention in Miami late in March, passed a resolution calling for (a) an increase in federal aid for highway purposes to not less than the total amount collected by the federal government in taxes from highway users; (b) administration of the federal-aid program through present channels; and (c) elimination of diversion to other purposes of tax funds collected from highway users by any unit of government.

The Commissioner: As every one in the highway business knows, Thomas H. MacDonald has retired as Commissioner of Public Roads after nearly 34 years. Mr. MacDonald, in fact, was the only man to hold this post until April 1, 1953 and, as someone has said, "The Bureau of Public Roads is a monument to his many years of outstanding service." We would like to add our voice to those of many in the highway field who are wishing him many happy years of retirement after a job well done. Our memory of things in the highway field doesn't go back too far, but we can remember when Mr. MacDonald and Charles M. Upham, then Engineer Director for the American Road Builders' Association, were two mighty and respected voices on Capitol hill in the battle for improved highway transportation in this country. The new Commissioner is Francis V. DuPont, of the famous family and former Chairman of the Delaware State Highway Department. Mr. DuPont brings a wealth of experience to the job. The Bureau of Public Roads is certain to make additional strides forward under his leadership. Our eyebrows raised a little, though, when we saw his remarks in an exclusive interview reported in the March 23rd issue of "Transport Topics", the national newspaper of the motor freight carriers: in this interview he is reported as being "opposed to the dissipation of large portions of the federal highway budget in the building of secondary roads and to the proposition of earmarking highway user taxes for road purposes."

Aggregate Gradations: The plotting of aggregate gradation specifications for bituminous concrete is the subject of an article by J. B. Dalhouse of the North Carolina District Office of the Bureau of Public Roads, writing in the April issue of *Public Roads* magazine. As is well known, aggregate gradation specifications for bituminous concrete generally specify either the total percentages passing each sieve of a series or the "fractions", that is, the percentages passing one sieve and retained on the next. It has been difficult to compare specifications written in these two different fashions largely because no practical means of plotting the second type for visual inspection has been available. Mr. Dalhouse describes a simple method for plotting the requirements of specifications which are stated in terms of "percentages passing and retained on"; the nature of a specified gradation may then be readily visualized and more easily compared with others.

Hot-Melt Plastic Stripe: We've been reading another bulletin from the Texas Engineering Experiment Station, College Station, Texas. This one is entitled "The Hot-Melt Plastic Stripe as a Pavement Marking Material" and was written by C. J. Keese. The hot-melt plastic stripe is composed of a resinous binder, pigments, fillers and sand which is applied at a temperature of 276°F. to a thickness of from 1/16 to 1/8 inch on either asphaltic or concrete pavements. It will harden sufficiently to accommodate traffic in less than 5 minutes after application.

(*Continued on page* 126)

Power-Packed 100% Hydraulic Performance

Large photo shows position of bucket when at extreme height above ground. Two small photos illustrate how, in excavation or loading, bucket follows slope of material—getting a full bucket with every stroke. Dempster-Diggster digs-in 15 inches below grade and digs out a 15 to 18 foot bank.

DEMPSTER-DIGGSTER OFFERS YOU BIG SHOVEL HYDRAULIC PERFORMANCE IN A SMALL, MOBILE UNIT...

The Dempster-Diggster is the only small shovel that offers you all these basic and important features of big shovels—*Simultaneous and Independent Crowd and Hoist . . . Hydraulic Crowding . . . Hydraulic Hoisting . . . Variable Crowd Action at any Dipper Position . . . Changeable Buckets.*

With these big shovel features, plus truck speeds on the job, and to and from jobs, the Dempster-Diggster enables you to speed up production for greater profits on jobs requiring excavation or loading!

Write for complete facts on this revolutionary, power-packed shovel. A product of Dempster Brothers, Inc.

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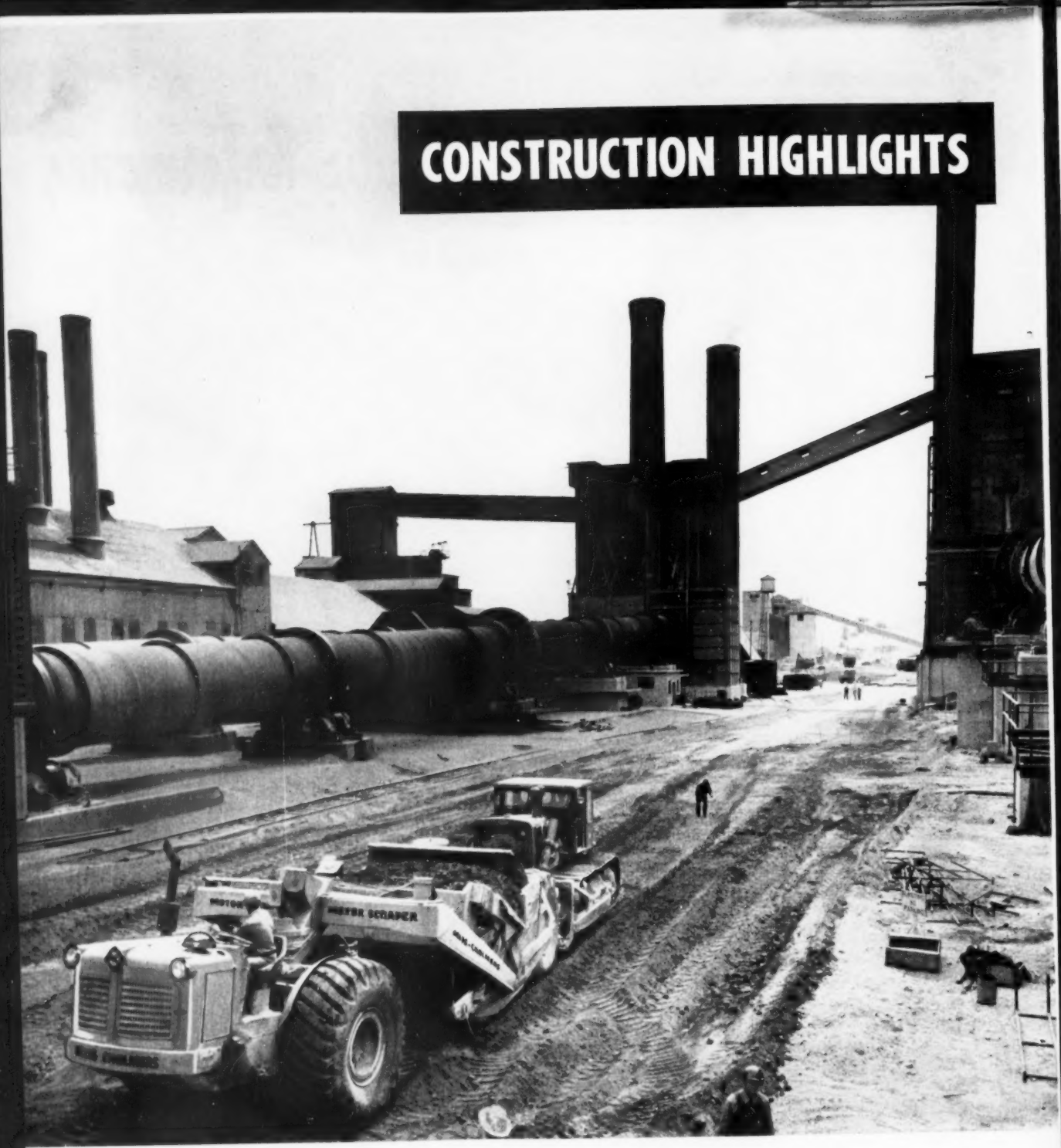
CONSTRUCTION HIGHLIGHTS



BUILDING RAILROAD BED — Here's a correctly matched earth-moving pair at work preparing the bed for a railroad spur in the yards of a large chemical plant. Up front is an Allis-Chalmers TS-300 Motor Scraper, moving up to 18 cubic yards of dirt every pass. Push-loading the TS-300 to a full, fast payload is an Allis-Chalmers HD-20 Tractor, with hydraulic torque converter drive.

A-C
ALLIS-CHALMERS

Allis-Chalmers equipment at work . . .

WORKING OIL MIX king size. That's what this big AD-40 Motor Grader is doing on a black-topping job. Built-in power steering simplifies operator's work by eliminating tiring "wheel fight."

FEEDING RIVER SAND to dragline is a tough job, but this HD-9 takes it in stride. Its Positive Seal truck wheels, idlers, support rollers keep grease in, trouble out . . . require lubrication only every 1,000-hours.

BACKFILLING on a water main and sewer construction job is just one of dozens of ways cost-conscious contractors use the versatile HD-5 Crawler.

LOADING BIG BOULDERS from rock pile to truck is a simple matter for this Allis-Chalmers HD-20G with four cubic yard, front-mounted tractor shovel.

CLOSE-QUARTER WORK is made for the Allis-Chalmers Model D. This versatile motor grader handles dozens of jobs, from road building to landscaping, easily and at low cost. And its usefulness is multiplied by several easily mounted attachments, including hydraulically controlled scarifier and rear-end loader.

Continued on next page

Thousands use our Readers' Service card to keep up to date . . . do you?

Allis-Chalmers helping both small and big contractors . . .

WIDENING ROAD. Owner found his HD-15 gives him up to 25 percent more output on short cycle dozing, because operator can go from any forward to any reverse speed in just one lever shift.

BETTER DITCHES result because an AD-40 operator can see graders front wheels and both ends of blade . . . because he has the advantages of Allis-Chalmers exclusive ROLL-AWAY moldboard.

FULLY LOADED and ready to make a sharp, downhill turn, this Allis-Chalmers 18-ton-capacity TR-200 Rock Wagon — with air brakes and low center of gravity — is under full control all the way.

ONE-MAN CONSTRUCTION CREW. This HD-9G with two cubic yard shovel, shown rough grading here, also lifts, dozes, digs, handles most bulk materials faster, better, more economically than before.

FLEET OWNERS GO ALLIS-CHALMERS, TOO. Contractors find the design advantages of Persian orange equipment bring more profit to their operations; and that rugged construction keeps it on the job longer. Now, to fit their jobs, they can select from seven scraper sizes . . . for use with any tractor.

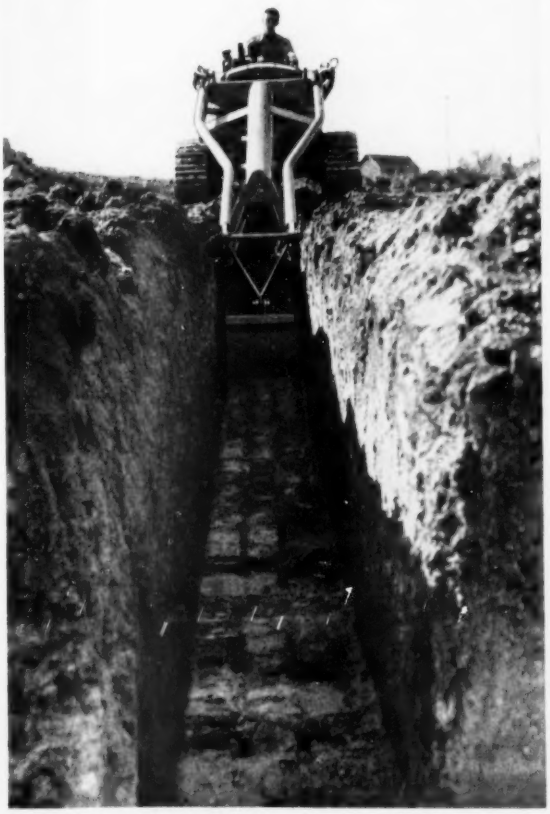
Need more facts about advertised products? Mail your Reader's Service card now.

handle today's jobs at lower cost . . .

HIGH-SPEED DIRT-MOVING TEAM loads and hauls big yardage on this large-scale operation. An Allis-Chalmers torque converter drive tractor helps load a trio of TS-200 Motor Scrapers and gives them a fast, smooth start from the cut. Quick to get moving, these hydraulically controlled Motor Scrapers speed to the fill with capacity loads up to 13 cu. yd., and with positive forced ejection, dump fast and clean.

FINISHING BETWEEN FORMS takes precision work. That's what this contractor is getting from his Model D . . . the low-cost motor grader, proved on dozens of jobs by thousands of users.

TOUGH DOZING JOBS are made to order for the torque converter HD-20. Matching power to the load exactly, this huge tractor automatically moves load at highest speed that conditions permit.



DIGGING TRENCHES. This hydraulically controlled front-end trench hoe is only one of a dozen attachments making Allis-Chalmers HD-5G the most useful tractor in the world.

Now's the time to mail this month's Readers' Service card.

It's a lot easier to work with

RIDGID

Extra-Utility Pipe Vises

Compare those work-saver RIDGID Vises with any others and you see the bonus of extra utility you get for your money. Kit vise is easily toted to the job, quickly clamped on edge of bench or plank, ready to use. All other RIDGID vises have handy integral pipe benders and rests to make cutting and threading easier. Full-width firm-gripping jaws of top quality tool-steel, bodies of rugged special malleable—for years of service. 9 models, yoke and chain, 23 sizes, meet every need. Get your money's worth—buy RIDGID Vises at your Supply House.

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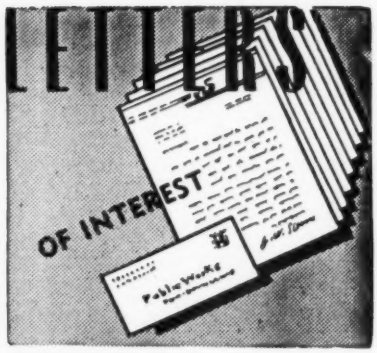


COOKING GARBAGE

Our member municipalities are faced with the proposition of converting from garbage feeding of hogs to cooked garbage feeding of hogs. I am interested in locating for them any standard cooking equipment that is available on the market. Would you be good enough to search your records for a source?

Thank you very much for checking this detail for me.

Gilbert Chavenelle,
Staff Engineer,
Michigan Municipal League,
Ann Arbor, Mich.

Ed. Note: See page 83 of this issue.

THAT MSC RESERVE

I have just read the editorial in March Public Works on the subject of "The Military Reserves and the Engineering Profession" and I say "Amen" to what you have written. Though I have tried to be active in the reserves, I see very little reserve activity available for sanitary engineers.

A Captain in 1944,
Out of the Service a Captain,
Still a Captain.

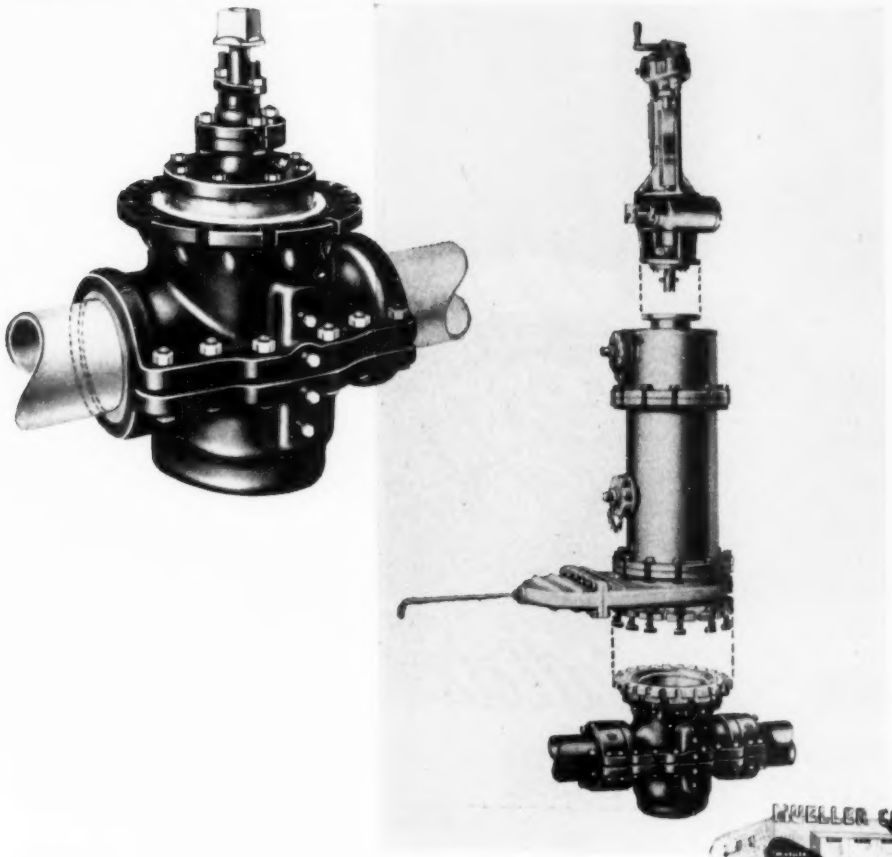
ENGINEERING SKILLS

The third editorial in the February issue of Public Works got me interested in finding out whether the congratulations on engineering skills applied to any cities in Michigan's Upper Peninsula. Since three of the 48 "Reports from the Field" were from this district, I'd say they did apply.

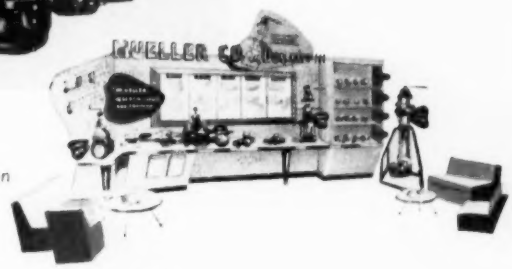
You might like to know that these three men also are exercising their skills and abilities in the sanitary engineering field. Two have municipal water supply projects under way and all three are preparing to construct sewage treatment plants.

Their skills, incidentally, seem to extend to the development of the

MUELLER®



Complete Inserting Valve installation shown in interesting translite presentation



Coming to Grand Rapids?

Drop in and see the new Mueller Inserting Valve and Equipment Exhibit at the AWWA Convention. Booth 102-103.

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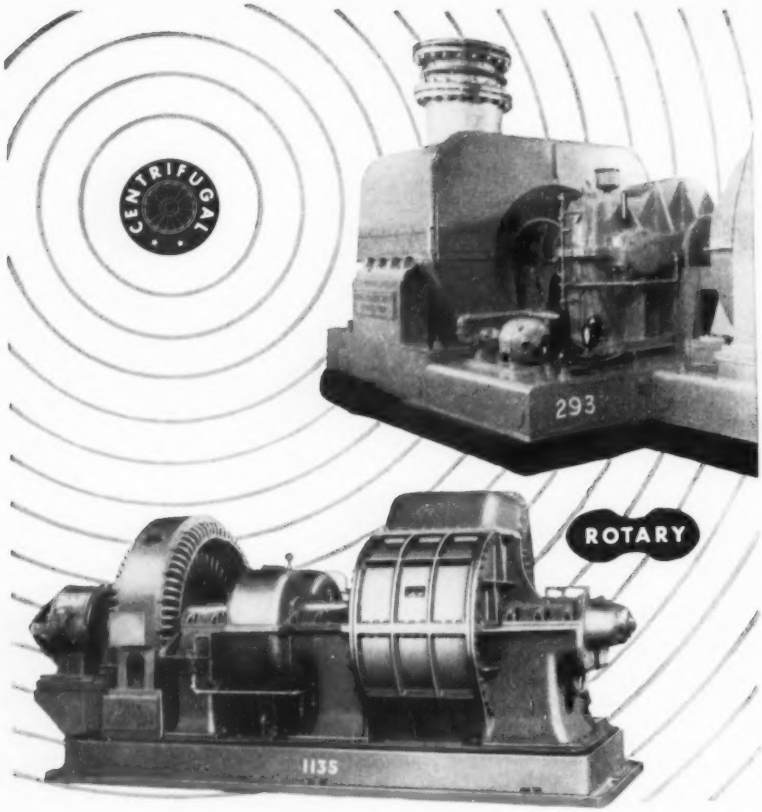
Get full details of this month's new products . . . mail your Readers' Service card today.



ONLY THE BLOWER *Specialists*
BUILD THE DUAL-ABILITY LINE

To meet the varying problems of handling air or gas in sewage treatment plants, Roots-Connersville builds two complete lines of blowers—Rotary Positive and Centrifugal. Together, they cover capacity requirements from 5 cfm to 100,000 cfm in single units. Thus, from this exclusive *dual-ability line*, units can be selected (without prejudice as to type) to match the needs of small community plants, industrial wastes treatment, or large volumes in metropolitan areas.

Regardless of the type or size which you may need, R-C Blowers are unmatched in reliability and long-time performance. Built into them is almost a century of specialized experience in handling gas and air, which is our exclusive business.

The long and increasing list of sewage treatment plants which are R-C equipped is perhaps the best evidence of continued satisfaction. These include many "repeat" buyers. If you have projects under way, and would like to talk to nearby users, we shall be glad to furnish their names. And, whenever we can assist in planning your installations of blowers and related equipment, our specialists are at your service.

ROOTS-CONNERSVILLE
Exclusive Specialists in Handling Gas and Air

ROOTS-CONNERSVILLE BLOWER
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abilities of their employees. And this gives me an opportunity to brag a little about these and similar officials elsewhere in my territory. Recently they:

1. Sent 41 men and women to the first water plant personnel school to be held in the peninsula. Two of the men were city engineers. While the enrollment was supposed to be limited to 20, we had to let down the bars.

2. Sent or brought their employees to the fifth U. P. Water Works Institute, at which about 80 persons heard or helped put on the program. I say "sent" because, in the words used in a newspaper item about one plant operator, his "attendance at the institute was approved and financed by the City Council."

Incidentally, engineers and other officials of the type you congratulate also have encouraged 45 men in the peninsula to apply this year for a water operator's certificate. So in the future you should receive even more Reports from the Field from this north country.

Russell L. Johnson,
Engineer in Charge,
Northern Peninsula Office,
Michigan Dep't. of Health,
Escanaba, Mich.

SLUDGE AS A FERTILIZER

We will appreciate information on the value of sewage sludge as a fertilizer.

Roland Campbell.
Office of the Co. Engr.,
Okanogan, Wash.

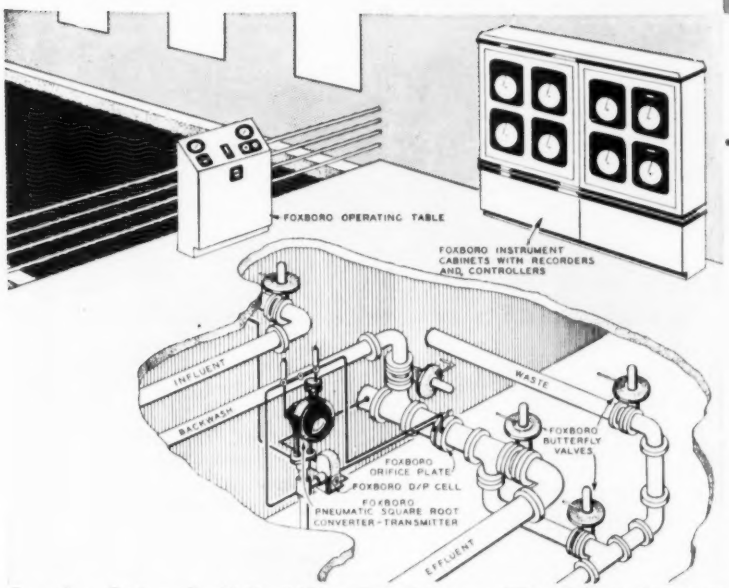
BOOKS IN BRIEF

SEWERAGE & SEWAGE TREATMENT

Here is Harold Babbitt's new seventh edition of his Sewerage and Sewage Treatment, a very fine book. A great deal of new information has been added—far too much to attempt to cover in this review. However an idea of the range of the book can be gained from the following items: Computing the minimum dissolved oxygen point; processes of treatment developed by Hays, Zigerli, Kraus, Okun and Fair; materials for air pipes; size of bracing for tunnels and trenches; fertilizing values of sludge; sludge utilization; protection of sewers; state specifications for design; septic tanks; and the disposal of radioactive wastes. There are 674 pages and the book is published by John Wiley & Sons, Inc., New York 16, N. Y. $8.

New! Exclusive!

"Fingertip" Control for rapid sand filters...



A modern Foxboro Rapid Sand Filter Control System. When Selector Switch on operating table is turned to desired position Foxboro Controllers automatically take over operational control of valves.

...a "foolproof" system that is easier to install, to operate, and to maintain

The New Foxboro Rapid Sand Filter Control System combines maximum operating convenience with a minimum of maintenance. Its all-pneumatic transmission and control eliminates drums, cables, and pulleys . . . makes possible remote operation of valves without high pressure piping to the control panel.

In normal operation, the operator needs only to turn the selector switch to one of its four positions to control: filtering; influent-off; backwashing; effluent-to-waste. Also, all adjustments of filtering and backwashing rates are easily made at the operating table.

All connections are made with ¼" copper tubing. Hence, installations with remote setting of flow rates . . . and with supplementary remote indication . . . are simple and economical.

Write for detailed Bulletin 466. **The Foxboro Company, 265 Norfolk St., Foxboro, Mass., U.S.A.** Branch offices in principal cities.

FOXBORO REG. U. S. PAT. OFF. **CONTROL SYSTEMS**

FACTORIES IN THE UNITED STATES, CANADA, AND ENGLAND

Need more facts about advertised products? Mail your Readers' Service card now.

CUT maintenance paint COSTS UP TO 50%

with Dixon Flake Silica-Graphite Paints!

This FREE Bulletin shows how! Write for it today!

Just out! This new Dixon bulletin actually can save you up to half your maintenance paint costs. It explains, in non-technical language, how the unique overlapping pigment flakes of Dixon Silica-Graphite Paints form a heavier, stronger paint film that resists cracking and chipping and protects longer. Industrial users of Dixon Flake Silica-Graphite Paints report 9 to 10 years between paintings, against an average of 5 years or less for other paints. Get the whole money-saving story from this new Dixon bulletin. It's FREE! Mail the coupon today!

Flake
DIXON
Silica-Graphite Paints
FOR LONGER PAINT LIFE
Write for your
FREE copy today!
Includes 16 actual paint chips . . . complete technical and application information.
SEE OUR CATALOG IN SWEET'S FILE

Paint Products Division

JOSEPH DIXON CRUCIBLE COMPANY

170 Wayne Street, Jersey City 3, N. J.

Yes! I'd like to cut maintenance paint costs up to 50%. Rush bulletin #V-60.

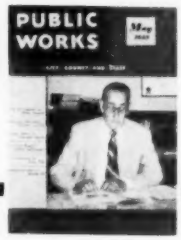
Name..... Title.....

Company.....

Street and Number.....

City..... Zone.... State.....

Now's the time to mail this month's Readers' Service card.



LEADERS IN THE PUBLIC WORKS FIELD

★

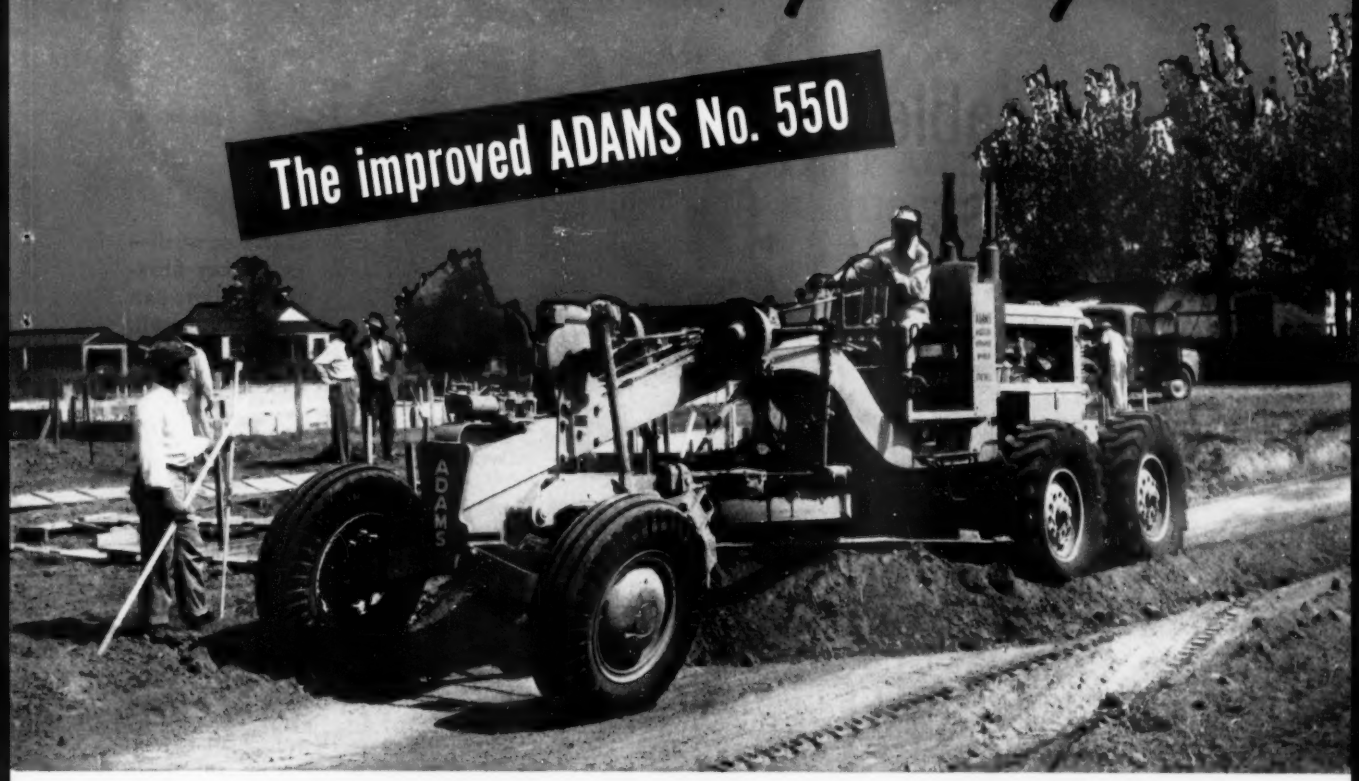
Thomas J. Skinker

If where a man gets to is even more significant than where he started from, genial **"Tom" Skinker,** as half the water works men in the country affectionately know him, has made a long and important journey in the forty years he has been around St. Louis. He started in 1913 as a levelman on the Howard Bend pipe line survey; 28 years later he was appointed Water Commissioner. That is the post he has held ever since except for a years as Director of Public Utilities; time out with Co. C of the 34th Engineers in France in World War I; and three years in business. As Commissioner, his present program for water works improvements contemplates an expenditure of over $20,000,000.

Way back in 1929, he was Chairman of the Missouri Valley Section of AWWA, and National Director in 1931 and 1932. Since then he has been president of the Engineers' Club of St. Louis and of the Missouri Society of Professional Engineers—to mention only a few of the posts he has held. He was born in Fredericksburg, Va.; and he and Mrs. Skinker, the former Iva Miller, have two daughters, Martha and Nancy. It is a pleasure to decorate our front cover with his portrait in recognition of his able and efficient administration of the water system in one of America's largest and most important cities.

Headed for New Popularity

The improved ADAMS No. 550



A Heavy-Duty 100 H.P. Grader with New Constant-Mesh Transmission

You have only to check the new and improved features that characterize the Adams No. 550 Motor Grader to know that here is one of the most efficient and versatile machines you can possibly own:

- **Powerful Diesel Engine:** Lots of lugging ability—easy to start—economical, dependable . . . Rubber mounted for vibration-free operation.

NEW **Constant-Mesh Transmission:** Quick, easy gear shifts . . . Helical gears—all on roller bearings—insure smooth, long-life performance . . . Finest transmission ever put into a motor grader.

- **8 Forward Speeds:** More working speeds and a higher travel speed (25 mph) than other graders . . . Save time—increase work production.

NEW **4 Reverse Speeds:** Up to 13.2 mph . . . Speed work on many jobs—backing between forms, bucking snow, etc.

NEW **"Creeper" Gears:** Optional in transmission at nominal cost . . . Provide 3 extra-low speeds—.22 to 1.76 mph . . . Valuable where slow-speed operation is desirable.

- **Positive, Easy-Working Controls:** Dependable, accurate adjustments—easy, natural steering.

- **Big, Comfortable Cab:** Roomy convenience for maximum operator efficiency—2-way adjustable seat.

NEW **Double-Action Braking System:** Operates on wheels and transmission—quick, safe stops with less pedal effort.

NEW **Foot Accelerator:** Drive grader like truck—great in traffic. Use it or hand throttle when working.

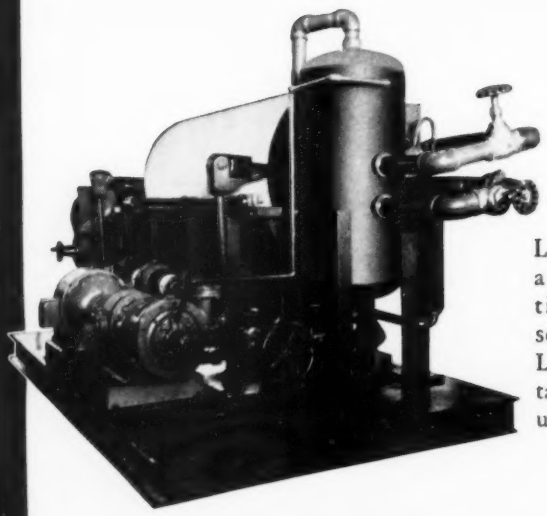
Discover how the new No. 550 will step up production and cut costs for you. See your local Adams dealer.

J. D. ADAMS MANUFACTURING CO. • INDIANAPOLIS, INDIANA

Make your next motor grader an

ADAMS

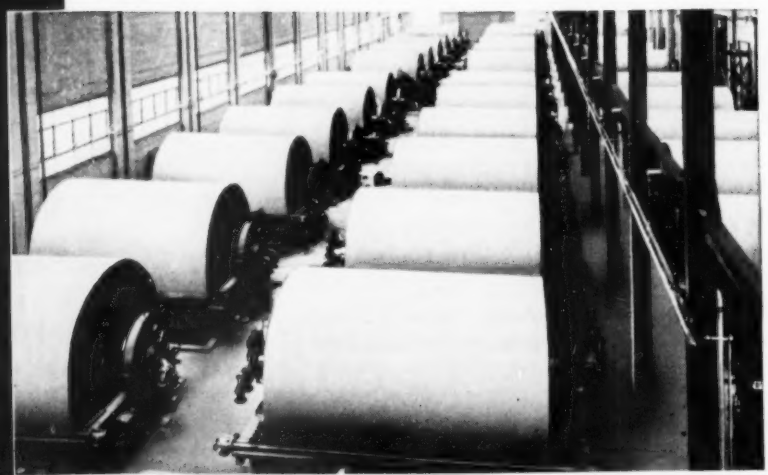
dependable process equipment built to fit your needs



Large or small—a Conkey filtration plant can serve you well. Left, a self-contained package unit.

CONKEY FILTERS FOR SLUDGE

66 Conkey Sludge Filters installed in one plant of Chicago Sanitary District. Built to exacting specifications and rigid design requirements.



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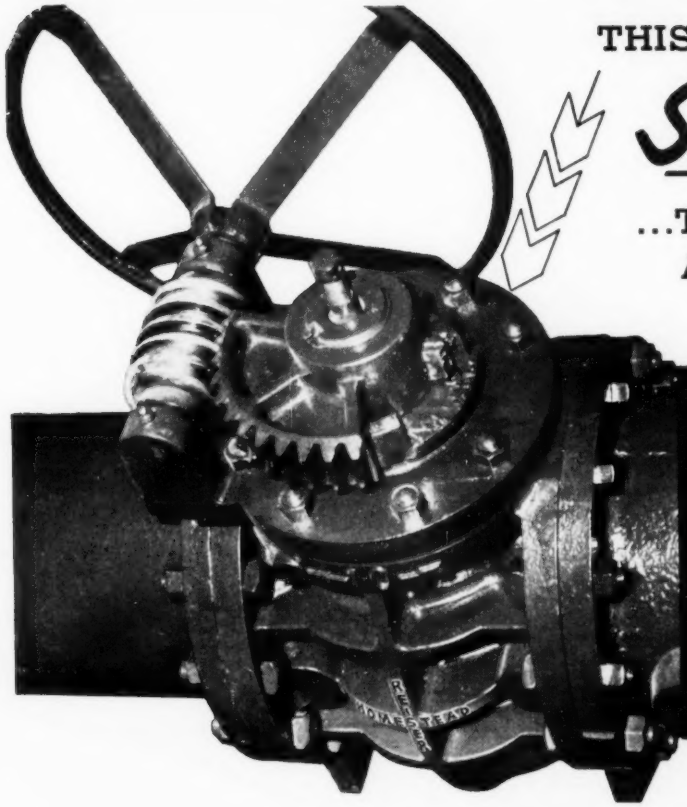

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Self-Seald...Lubricated

PLUG VALVE

A Homestead-Reiser *acts on its own* to maintain a *drop-tight seal* at all times. It continually and automatically—without manual assistance—adjusts itself to make up for wear as wear occurs.

Its ability to thus effectively seal itself is due to the wedge-action of its two-piece plug which, *under line pressure,* causes the finely finished plug surfaces to constantly press outward to form a perfect seal against the mirror-like bore of the body. A full lubricant seal surrounds the ports and top and bottom of the valve.

Extra-long, leakless service . . . more operations between lubrications—up to 22 times more by actual tests with other well-known lubricated plug valves . . . less maintenance and lower plant operating costs result from their use.

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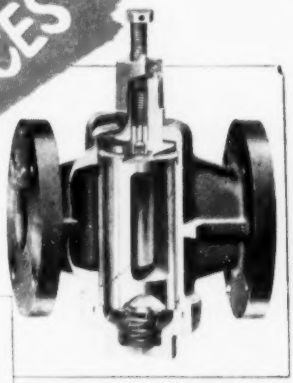
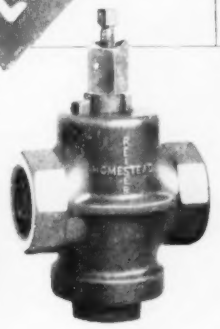
NOW! AT LOWER PRICES

Complete data and prices will be sent on request. Write today for VALVE REFERENCE BOOK No. 39. No obligation. For local distributor, see Yellow Pages of your Telephone Book.





Sectional View of Full Port Area Homestead-Reiser Valve

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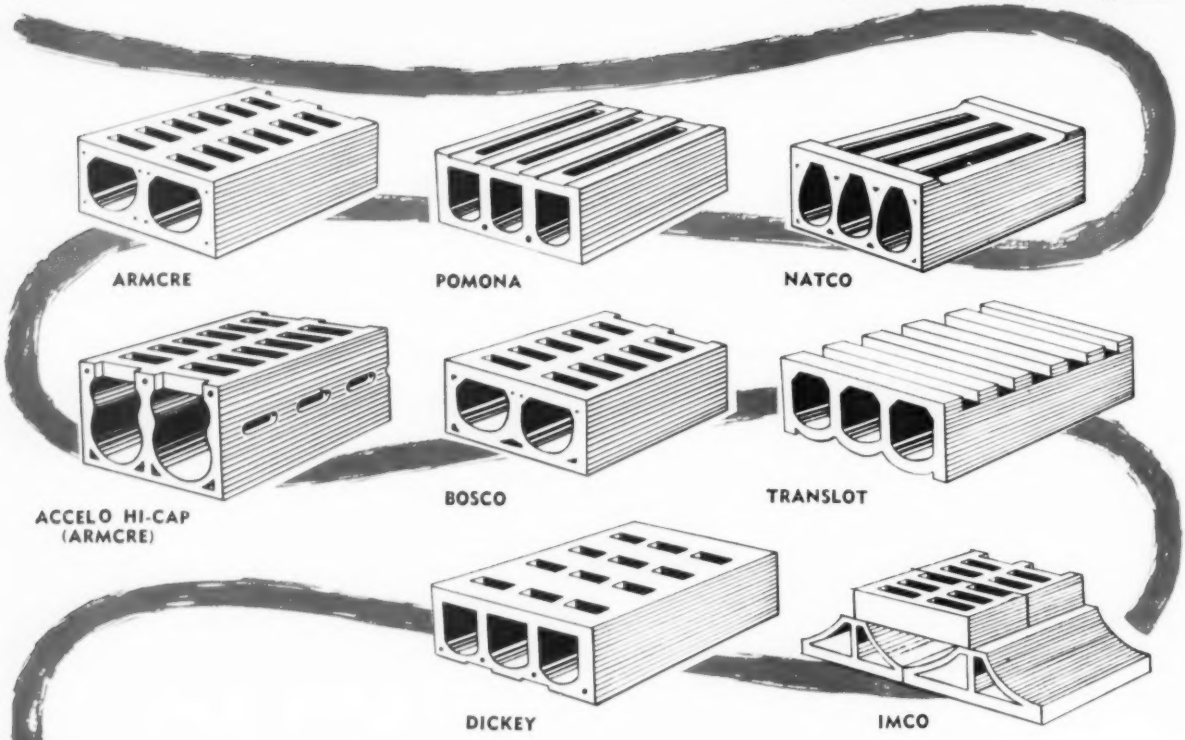

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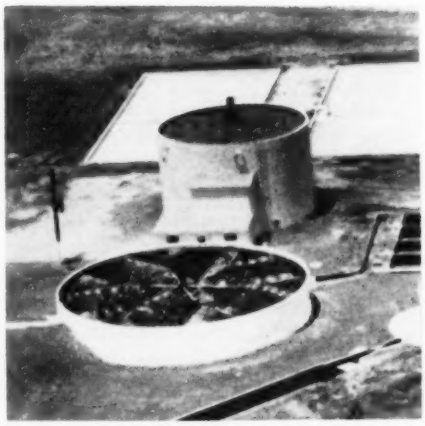
USE TFF INSTITUTE SPECIFICATION UNDERDRAINS

The scientific design of these *vitrified clay filter bottom blocks* insures trouble-free operation for the life of the filter. They have large top openings. That means proper ventilation of all filter media and free discharge of the filter effluent at all times. They have smooth run-off channels. That means quick drainage and no clogging even with years of operation. The blocks are light in weight, self-aligning and easy for unskilled labor to lay. After they have been laid they are strong enough to work on and to support even very deep filter media.

These modern underdrain blocks will carry applications up to 50 MGAD. They are best for all kinds and shapes of filters. They are used everywhere better operating results are desired.

Use them to insure best results from your next trickling filter. Give it a *specification* floor. Use TFFI *vitrified clay filter bottom blocks*. For full engineering details write any member of this Institute today.



Yeomans Brothers' "Aero-Filter" System plant at Plant City, Florida.

Here's the Payoff . . .

Placed in operation in May, 1951, the Plant City, Fla., sewage treatment plant has produced remarkable results, even considering that it is loaded far below design. For 11 months of 1952, raw sewage BOD averaged 208 ppm and final effluent 13 ppm. Average flow was 0.52 mgd.

TFFI

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this "whirling tube" doesn't clog!

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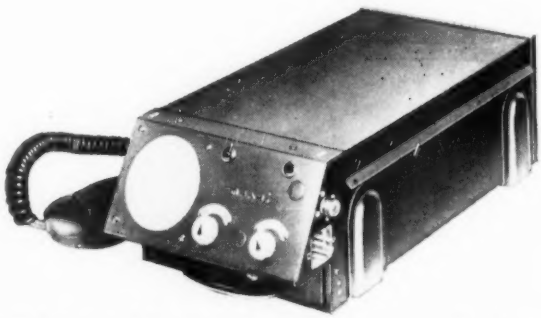
cuts "down time" and "deadheading" —makes each day's operations more profitable with maximum use of equipment

Progressive companies are using Motorola 2-way radio to get greater day-by-day returns from their investment in equipment. Instant Motorola communications co-ordinates operations, reduces lost time, helps meet construction deadlines . . . reduces "deadheading." Costly breakdowns are reported in seconds. Improved efficiency of every piece of equipment pays for Motorola installations over and over again.

Eight exclusive Motorola features guarantee precision selectivity, time-tested durability, obsolescence-free design. Permakay, Motorola's permanent selectivity wave filter, eliminates 15 nuisance tuning adjustments forever. Get all the facts about this rugged, reliable communications tool. *Write to Dept. 2286-PW today!*

Construction foreman, operating base station console, maintains instant supervision, keeps progress report up to date, co-ordinates activities between crews.



Uni-Channel Sensicon Dispatcher serves as a fixed or mobile station. It's ruggedly built to take jolts and shocks of rough roads . . . obsolescence-proof circuits stay up to date for years to come.

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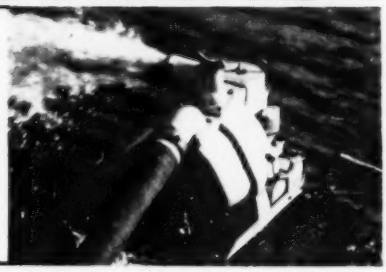

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Fast is the word for Homelite . . . and fast is an important word when water is slowing up a job.

Small and compact, a Homelite Gasoline Engine Driven Pump is light enough for one man to carry. You can get it to the job without heavy trucking, planking, pushing or hauling. And in action it performs like a pump many times its size. Handles up to 15,000 gallons per hour. Is self-priming . . . in only a few seconds. Has a guaranteed 28 foot suction lift. Keeps seepage *automatically* at strainer level. And is non-clogging, self-cleaning, weatherproof, dustproof and foolproof.

Why let water cause delays that run up costs when a Homelite will eliminate water and costly delays *fast?*

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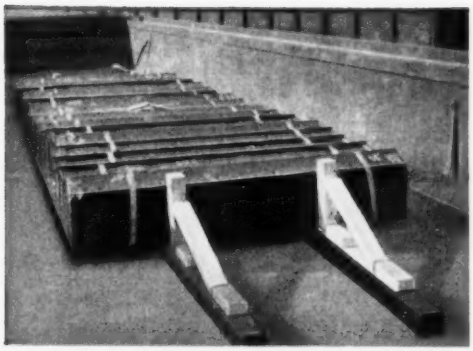

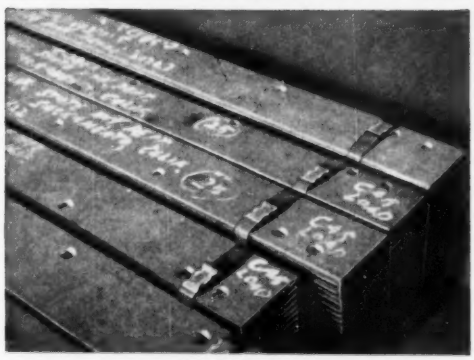

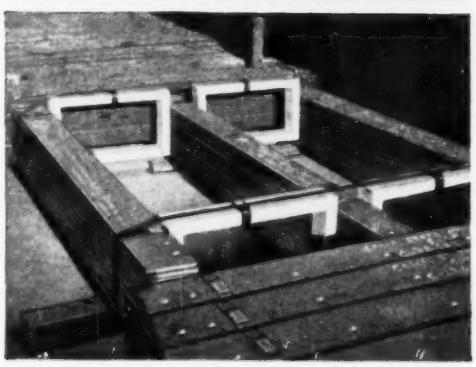

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Just as Pacal Blades resist wear, fit tighter . . . last longer, Pacal does a job for you. Whether you're just around the corner or 2,000 miles away, your Pacal Blades are expedited carefully. When you want blades, call on Pacal.

Use PACAL Heat Treated Plow Bolts . . . they increase the efficiency of PACAL Blades.

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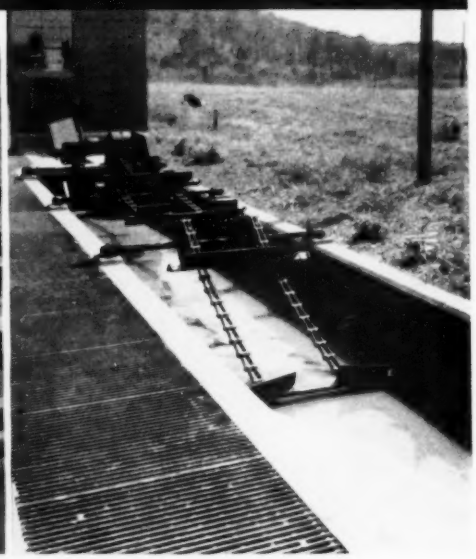

... in the hills of Pennsylvania

Altoona, Pa., as hundreds of other municipalities in the nation, called on Jeffrey for the most modern engineered equipment for treating sewage. The above illustrations show a part of a coordinated sewage system that Jeffrey engineers designed specifically for Altoona.

City engineers prefer Jeffrey equipment. They like the way Jeffrey engineers help them develop *methods* for *results*.

Whether the problem is water, sewage or industrial wastes, rely on Jeffrey experience and engineered equipment. Write Sanitation Division for Catalog No. 833 today.

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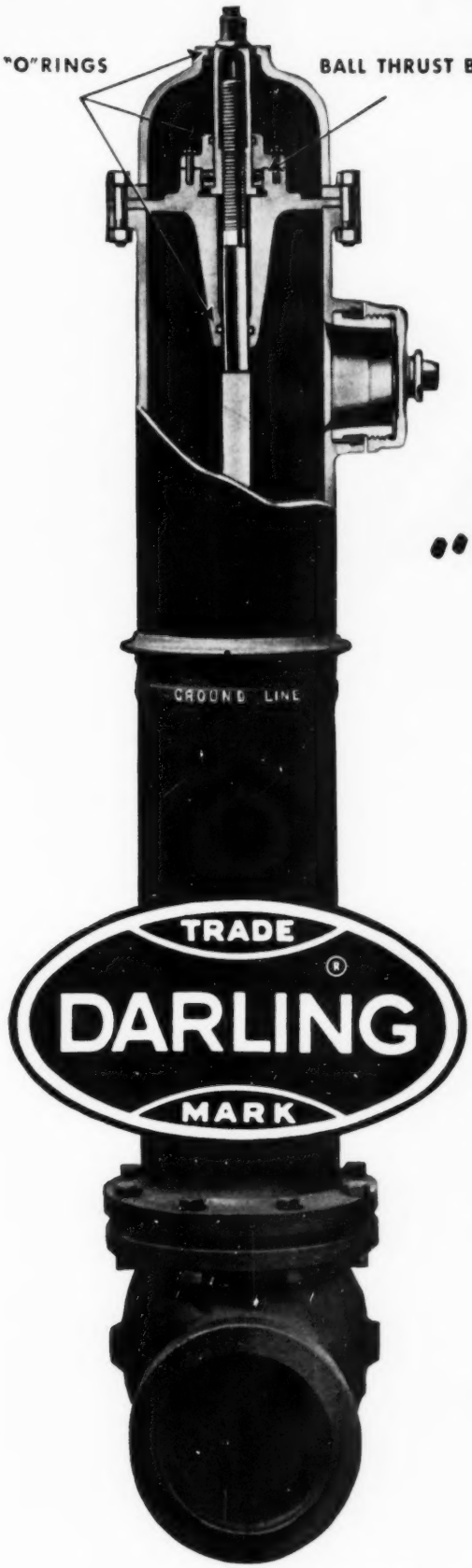

IT'S DARLING'S NEW

B-50-B

Patent Pending

FIRE HYDRANT

...What a difference!

YES, what a *difference!* That's the word that's going around about the new and unique B-50-B—rated the most important advance in fire hydrant design in 50 years.

First, note that the B-50-B is *ball bearing* operated. Opening and closing takes less than half the usual wrench torque. *Smoother, faster, easier* operation every time!

Next, see how the B-50-B design uses "O" ring seals. No need for a stuffing box. It's a packless, *dry-top* hydrant. And it saves plenty of time and trouble! Does away with bothersome packing gland adjustment as well as the usual lubrication and maintenance of packing. Moreover, this "O" ring arrangement not only prevents the loss of thread and bearing lubricant, but never lets a drop of water reach the operating threads. Just add up *these* advantages!

As in any Darling hydrant, all inside working parts (main valve, main valve seat, drain valves and drain valve seats) can be removed through the top of the B-50-B for easy inspection and simplified maintenance. One 15-pound wrench does the trick, regardless of trench depth.

Before you decide on *any* hydrant, get *all* the facts on the Darling B-50-B.

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Efficient Refuse Collection Unit Carries Bigger Load at Lower Cost

266. Nine features which result in new economy, efficiency and cleanliness of the Heil "Colecto-Pak" are outlined in illustrated Bulletin BH-53160, issued by the Heil Co., Milwaukee 1, Wis. Be sure to check all the ways this easy loading quick dumping unit is designed to help you do a modern, sanitary refuse collection job. Check the coupon now.

What APWA Can Do For You

276. All of those engaged in public works activities will benefit by joining the American Public Works Association. For full information about membership, without obligation, check the coupon or write D. F. Herrick, Executive Director, American Public Works Association, 1313 East 60th St., Chicago 37, Ill.

Thinking of Sanitary Fill? Get This Booklet Now

285. Good management of sanitary land fills requires rugged, dependable equipment to excavate dirt, compact refuse and handle cover material. Such equipment, in use on landfill projects coast to coast, is featured in a new 8-page booklet titled "Community Workers," issued by the Caterpillar Tractor Co., Peoria 8, Ill. Check the coupon for a copy.

Instrumentation and Control Equipment For Water and Sewage Plants

298. Full engineering data on the instrumentation and control equipment needed in water works, sewage plants, pumping station and related installations are provided in the "Application Engineering Data" binder issued by the Foxboro Co., Foxboro, Mass. Every engineer and designer should have this valuable material on hand. Check the coupon if you can use this data.

Publication on Motors and Drives For Sewage Treatment Plants

248. The Sewage Works issue of the "E-M Synchronizer", publication of the Electric Machinery Mfg. Co., Minneapolis 13, Minn., contains interesting articles on sewage treatment processes and plants, with special attention to the applications of synchronous motors and magnetic drives in these plants. For interesting and informative reading, get issue No. 200-SYN-38 by checking the coupon.

Pipe-Laying Instruction Booklet Is Easy to Read

149. A new pipe-laying instruction booklet, written in straightforward language, explains every operation in laying concrete pressure pipe. "How-to" photographs and simplified diagrams show just how the job should be handled. Get copies of this 16-page booklet from Price Brothers Co., Dayton, Ohio, by checking the coupon.

Study the Advantages of the Allis-Chalmers Model D Grader

287. The low-cost Model D grader, built with big grader design and performance advantages, is the subject of a 20-page, profusely illustrated bulletin available from Allis-Chalmers Mfg. Co., Tractor Division, Milwaukee 1, Wis. Details of construction features and many examples of jobs the Model D will perform are included in the booklet. Check the coupon for your copy.

Helpful Data On Pipe Tools

230. Toledo drop head ratchet threaders are light, compact, ideally suited for work in tight corners. Three models for ⅛" to ¾"; ⅛" to 1¼"; and ¾" to 2" pipe all feature quick change of sizes. Get Catalog 11a52 from Toledo Pipe Threading Machine Co., Toledo, Ohio. Check the coupon.

IBM Accounting For Local Government

270. Ways that counties, cities, towns and other forms of local government can increase efficiency and simplify and improve operations by the use of mechanized accounting and recording procedures are described in a new booklet, "IBM Accounting—Local Government." This 48-page booklet shows in detail how IBM systems may be utilized by all departments. For a copy, use the coupon or write to IBM Department of Information, 590 Madison Ave., New York 22, N. Y.

Complete Booklet on Pipe Line Equipment

246. Equipment for all types of jointing, maintenance and repair jobs on water, gas and sewer lines is described and illustrated in Catalog No. 25 issued by Joseph G. Pollard Co., New Hyde Park, N. Y. Leak detectors, pipe finders, melting kettles, cleaning tools and a full line of hand tools for water and sewer departments, and many other items are included. Be sure to get your copy now. Just check the coupon.

How To Build Stabilized Heavy Traffic Pavements

233. A 16-page booklet published by Seaman Motors, Inc., Milwaukee, Wis., shows how low cost, local materials may be utilized in the construction of heavy duty pavements. Many illustrations and well-written text give full instructions on materials and construction methods for subgrades, subbases and base courses. A worth-while booklet for every highway engineer. Check coupon for copy.

Helpful Data On Porous Media

245. "Electro" diffuser plates for activated sludge plants are described in new Bulletin 950 of Electro Refractories and Alloys Corp., 344 Delaware Ave., Buffalo 2, N. Y. Full data are offered on the characteristics of Kellundite and Electrofio plates, both of which are designed for minimum pressure loss and uniform air diffusion. Check the coupon for your copy.

Water Conditioning for Swimming Pools

288. Equipment for swimming pools, manufactured by Graver Water Conditioning Co., 216 W. 14th St., New York 11, N. Y., is featured in a comprehensive new 12-page bulletin which covers modern equipment for filtering, recirculating, chemical treatment, cleaning and accessories. Typical drawings, dimensions and capacity tables are included. Get Bulletin WC-109 by checking the coupon.

Helpful Data On Pipe Couplings and Repair Clamps

194. Comprehensive data on compression pipe couplings and band type pipe repair clamps in ½" to 12" sizes and larger are offered by Morris Coupling and Clamp Co., Box 632, Ellwood City, Pa. Testing laboratory reports and installation pictures are included. For your copy check the coupon.

Operator's Handbook For Cable and Hydraulic Shovels

284. In a cartoon-style handbook, Caterpillar Tractor Co. explains the techniques of all types of excavation jobs with Caterpillar cable and hydraulic shovels. Four-color illustrations show these tractor-mounted machines on pavement construction and repair, culvert installation, gravel digging and many other operations. Check the coupon for your copy.

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Samples taken from the test holes go to Layne's central laboratories, where technicians report on the earth structure and qualities of the water. From these reports, water-system recommendations are made.

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Into every Layne well goes equipment designed for the specific job—the finest equipment, produced with the greatest economy, because of Layne's thorough engineering skill and world-wide experience.

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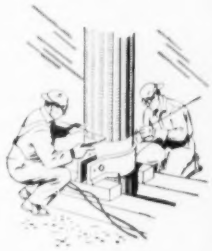
Skilled Layne workmen handle every stage of the job—assuring a system custom-engineered for your own situation. And Layne's experience is always at your service for any maintenance work you may need.



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Layne welcomes the opportunity to share in long-range planning for your water-supply needs. For information on any phase of well water supply or pump equipment, contact your nearest Layne Associate Company or write Layne & Bowler, Inc., General Offices, Memphis 8, Tenn.

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WATER WELLS • VERTICAL TURBINE PUMPS
WATER TREATMENT

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To order these helpful booklets check the coupon on page 36.

NEW LISTINGS (Cont.)

Helpful Data on Sluice Gate Design

268. In a 40-page bulletin published by Filer & Stowell, Milwaukee 7, Wis., you will find full information on sluice gates and operating mechanism for all applications. Helpful data on selection, design and installation are included. Get Bulletin 753 by checking the coupon.

Test Kit For Swimming Pools

269. Tests needed for scientific control and maintenance of swimming pool waters may be performed easily with the Hellige Twin-

Kit. Twin pocket-size comparators with non-fading glass color standards are used for pH and chlorine or bromine determinations. Folder No. 800-F give full details on this convenient outfit. Get your copy by checking the coupon. Hellige, Inc., Garden City, N. Y.

Why Salt Buying Should Be A Year 'Round Operation

243. "Buy early and avoid winter transportation tie-ups" is the theme of Cayuga Rock Salt Co., Inc., Myers, N. Y., suppliers of rock salt for snow and ice control. Helpful data on stockpiling with "Rayn-Shed" covers is offered by this company. Check the coupon for full data.

"Dynarc" Process Cuts Tile, Transite, Rock

250. Stone cutting and melting with 8,000° arc torch is described in new data from Eutetic Welding Alloys Corp., Flushing 58, N. Y. This process, utilizing a self energizing arc rod and powered by an electric welding machine, requires no ground connection and quickly pierces concrete and other refractory materials. Use the coupon for full information.

Handy Blade Selection Chart For Masonry Saws

238. A handy chart for the selection of diamond blades for masonry saws for cutting hard, medium hard and soft materials, plus suggestions for increasing blade life and detailed price list may be obtained by checking the coupon or writing Robert G. Evans Co., 6315 Brookside Plaza, Kansas City 13, Mo.

Inexpensive Crane For Water Department

261. Handling pipe, hydrants and valves; form pulling; and many other jobs that require a light-weight, economical crane can be solved with the versatile Pitman Hydra-Lift, an inexpensive crane that fits on the frame of any 1½ ton or larger truck. Get the full story by checking the coupon. Pitman Mfg. Co., 300 W. 79th Terr., Kansas City, Mo.

Clean Cuts for Concrete and Blacktop

22. Quick cuts in pavement are easily made with the Tri-Line concrete cutter, which leaves a smooth, clean edge to prevent spalling of patch material. For all details on the Tri-Line cutter and double-bonded diamond blades get form 500A from Tri-Line Co., 921 Carroll St., Racine, Wis. Just check the coupon.

For Fast, Smooth Pipe Cuts

189. The Wachs National air-powered pipe saw cuts cast iron or steel pipe from 10" to 48" diameter, leaving clean-cut, milled edges. Get full information on this unit from E. H. Wachs Co., 1525 N. Dayton St., Chicago 32, Ill., by using the coupon.

Rubber Traffic Cones For Safe Traffic Barriers

279. Safe and convenient traffic barriers can be placed quickly when you use the inexpensive rubber Safe-T-Cone. Now available in two sizes, painted or reflectorized, they will meet every day or night requirement. Special warning signs are easily attached. Full details from Radiator Specialty Co., Charlotte, N. C. Check the coupon today.

Reflective Signs and Markers For State, County and Municipality

63. Traffic control, warning and directional signs of Reflexlite, a patented reflecting material, are presented in a colorful new catalog of the Reflexlite Corp., 114 Manhattan St., Stamford, Conn. Besides the regulatory and warning signs this comprehensive catalog covers delineators, barricades, emblems and sign accessories, and includes a sample of the material. Check the coupon now.

●

WATER WORKS

Head Loss Data On Plastic Pipe

26. Carlon Products Corp., 10225 Meech Ave., Cleveland 5, Ohio, announces that authoritative data has been compiled on head loss due to friction in Carlon plastic pipe and is available in the form of graphs and charts. The graphs show superior flow characteristics, attributed to the fact that plastic pipe is not "wetted" by water. Send for this data today by using the handy coupon.

To Restore Capacity Of Water Lines

78. Water pipe cleaning service by hydraulic methods, power driven cleaners for scale and encrustation removal, plus relining of water mains are services offered by Ace Pipe Cleaning Contractors, Inc., 2003 Indiana Ave., Kansas City, Mo. For full description of these and other pipe cleaning services get the illustrated Ace catalog. Just check the coupon.

Low cost, pure filtered water, for small and medium size municipal water works now possible with a—

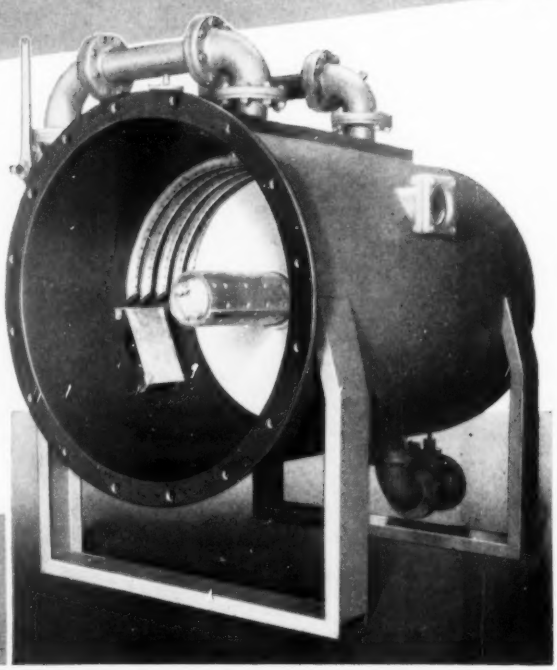
SPARKLER Model SCJ self cleaning water filter

The model SCJ filter is a diatomite slurry feed filter designed to produce the highest quality pure water at a maintenance cost much lower than usually can be attained with older type filters.

This filter can be cleaned in two to five minutes either by flushing off with the built-in jet spray or by backwashing or a combination of both. The filter media is usually a synthetic cloth such as orlon which pre-coats quickly and washes clean rapidly.

A high efficiency diatomite slurry feeder, which operates in conjunction with the SCJ Sparkler Filter, adds greatly to the length of cycle between cleanings . . . resulting in lower operating costs. Operators can be easily trained . . . no highly skilled specialized personnel required. Floor space occupied by the SCJ is relatively small for the extremely large volumes handled. Single units are available in sizes to handle up to 96,000 G.P.H. . . . or over 1,000,000 gallons per day. And . . . this is important . . . the largest unit uses less than 1000 gallons of water to clean the filter.

Write for plans and prices on your requirements. Personal engineering service on all installations.

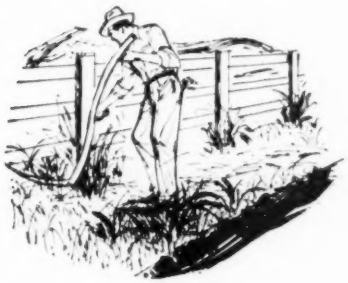


SPARKLER MANUFACTURING CO. MUNDELEIN, ILL.

New Powerful Weed Killer Cuts Maintenance Costs

for

PUBLIC WORKS



Du Pont CMU

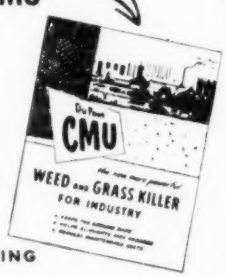
KILLS WEEDS AND GRASS AND PREVENTS REGROWTH

Small quantities of Du Pont CMU kill weeds and prevent their regrowth. CMU controls most species that are a maintenance problem around drainage ditches, sewage and water plants, fences, storage tanks, stockpiles and machinery sheds.

- Economical, low application rates usually keep ground clear through an entire growing season or longer. As little as 40 to 60 lbs. per acre or 1 to 1½ lbs. per 1,000 square feet often does the job.
- Kills most kinds of weeds and grass and prevents regrowth. It works through the roots . . . just spray it on the ground.
- Eliminates fire hazards caused by unwanted vegetation.
- Saves work, cuts maintenance. One spray with CMU takes the place of repeated hand cutting, mowing, or other less effective means.
- Non-flammable, non-volatile, non-corrosive. Comes as a wettable powder to mix with water.

Get This Full-Color, Illustrated Booklet Showing Results With CMU

Also tells how to use it. For your copy, use the coupon.



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BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

E. I. du Pont de Nemours & Co. (Inc.)
Grasselli Chemicals Dept. S-5 Wilmington, Del.

Please send me illustrated booklet and other information about CMU.

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Firm_____

Street_____

City_____ State_____

It's a fact . . . our handy Readers' Service card is the way to get new catalogs.

To order these helpful booklets check the coupon on page 36.

Painting Water Tanks For Longer Protection

52. High labor costs demand special consideration when painting elevated water tanks. This and other factors involved in proper paint selection are discussed in a bulletin issued by Jos. Dixon Crucible Co., Jersey City 3, N. J. Helpful specifications for repainting water tanks are also included. Check the coupon today.

Efficient Coagulation With Ferri-Floc

69. Advantages claimed for Ferri-Floc as a coagulant include wide pH range, quick floc formation, manganese removal, control of certain tastes and odors, plus other aids in high quality water production. Check coupon for complete Ferri-Floc data. Tennessee Corp., Grant Bldg., Atlanta, Ga.

Floatless Liquid Level Controls

92. Complete descriptions of electrode type floatless liquid level control systems, including control units, electrodes and fittings, panel assemblies and diagrams of typical installations for all types of municipal service are covered in the 32-page catalog of Charles F. Warrick Co., 1956 W. Eleven Mile Rd., Berkley, Mich. Check coupon for your copy.

Tested Jointing Materials

102. "Hydrotite" is a self-caulking, self-sealing joint compound for bell and spigot pipes. For data book and sample write Hydraulic Development Corp., 50 Church St., New York, N. Y.

Propeloflo Meters Check Water Usage

104. Water saving programs start with flow data, and the versatile Propeloflo meter will get the facts you need. Available for lines 2" to 36" in diameter or larger, with electrical or mechanical remote indicating, recording and totalizing. All the facts in Bulletin 380-G2A from Builders-Providence, Inc., 356 Harris Ave., Providence 1, R. I. Check the coupon today.

Pressure Pipe That Retains Capacity

106. Several bulletins describing the construction of pressure pipe, list of installations, carrying capacity tests, making service connections under pressure; and detail descriptions of several installations. Lock Joint Pipe Co., Box 269, East Orange, N. J.

Rapid Sand and Pressure Filter Data

109. Rapid sand filters. A complete line of vertical and horizontal pressure filters, wooden gravity filters, and filter tables and other equipment. For engineering data, write Roberts Filter Manufacturing Co., 640 Columbia Ave., Darby, Pa.

Makes Underground Pipe Installations Easy

115. One-man operated hydraulic pipe pusher pushes pipe through ground under streets, sidewalks, lawns and other obstacles. Pays for itself in man hours saved on first few jobs. For complete facts ask for Form E-213, Greenlee Tool Co., Rockford, Ill. Just check the coupon.

Discussion of Ranney Method For Municipal Water Production

116. A very interesting study of municipal and industrial water supply problems and a complete discussion of Ranney Collectors for water production will be found in a 20-page booklet published by Ranney Method Water Supplies, Inc., Box 277, Columbus 9, Ohio. Water quality, construction methods, costs, performance and other topics are considered. Check the coupon to get your copy.

How Accurate Boring Speeds Underground Pipe Installations

135. Interesting charts showing earth boring costs, speed and accuracy for holes from 2½" to 14½" diameter and up to 80 feet long are included in 16-page Catalog No. 8 issued by Hydranger Corp., 681 Market St., San Francisco 5, Calif. Specifications and general operating instructions are also covered.

Pipe Detector Determines Exact Location and Depth

120. Determination of the exact location and depth of buried pipes, valves, service cables and other metallic objects can save costly digging and unnecessary damage. Your work can be speeded when you use the Detectron pipe detector, which features simple operation, shielding to avoid static interference, economical unit construction and a lifetime guarantee. Get full data from Detectron Co., 5631 Cahuenga Blvd., No. Hollywood, Calif., by using the coupon.

How Your Filter Washing Can Be Improved

136. More thorough sand washing with the elimination of mud balls and cracking with resultant longer filter runs are claimed for the Palmer Filter Bed Agitator, described in bulletins issued by the Palmer Filter Equipment Co., P. O. Box 1655, Erie, Pa.

Helpful Data on Mechanical Joints

138. Get Circular 49 from M & H Valve & Fittings Co. for important information and installation dimensions of M & H AWWA Mechanical Joint Valves and Hydrants. Features include ease of installation, construction economy, long life. Use coupon or write M & H Valve & Fittings Co., Anniston, Ala.

Engineering Data on Diatomite Filters

139. Get complete data on the Sparkler model SC-J diatomite slurry feed filter for swimming pools from the Sparkler Mfg. Co., Mundelein, Ill. Check the coupon for full information including table of filter sizes and capacities, space required and filter operation.

96 Page Book Helps Solve Water Problems

71. pH and Chlorine Control. A discussion of pH control and description of comparators, colorimeters and similar devices. A 96 page booklet. W. A. Taylor & Co., 7304 York Road, Baltimore 4, Md.

Write For 32 Page Catalog

- Pump Controls
- Duplex Pump Alternators
- High and Low Level Cutoffs
- High and Low Level Alarms
- Multi-level Signals
- Liquid Metering
- Special Controls and Panels

Listed by Underwriters Laboratories

CHARLES F. WARRICK CO.

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Warrick

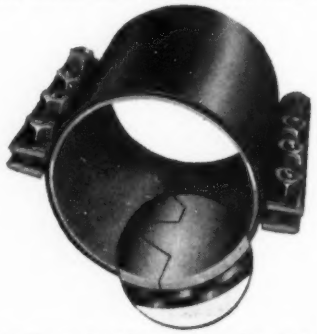
FLOATLESS
LIQUID LEVEL CONTROLS
ELECTRODE TYPE

FOR A ONE MAN—ONE WRENCH INSTALLATION

specify MORRIS DUAL-PURPOSE COUPLINGS

FOR FAST, DEPENDABLE, PERMANENT PIPE REPAIRS

SIMPLICITY • DEPENDABILITY • DURABILITY • ECONOMY • SPEED •

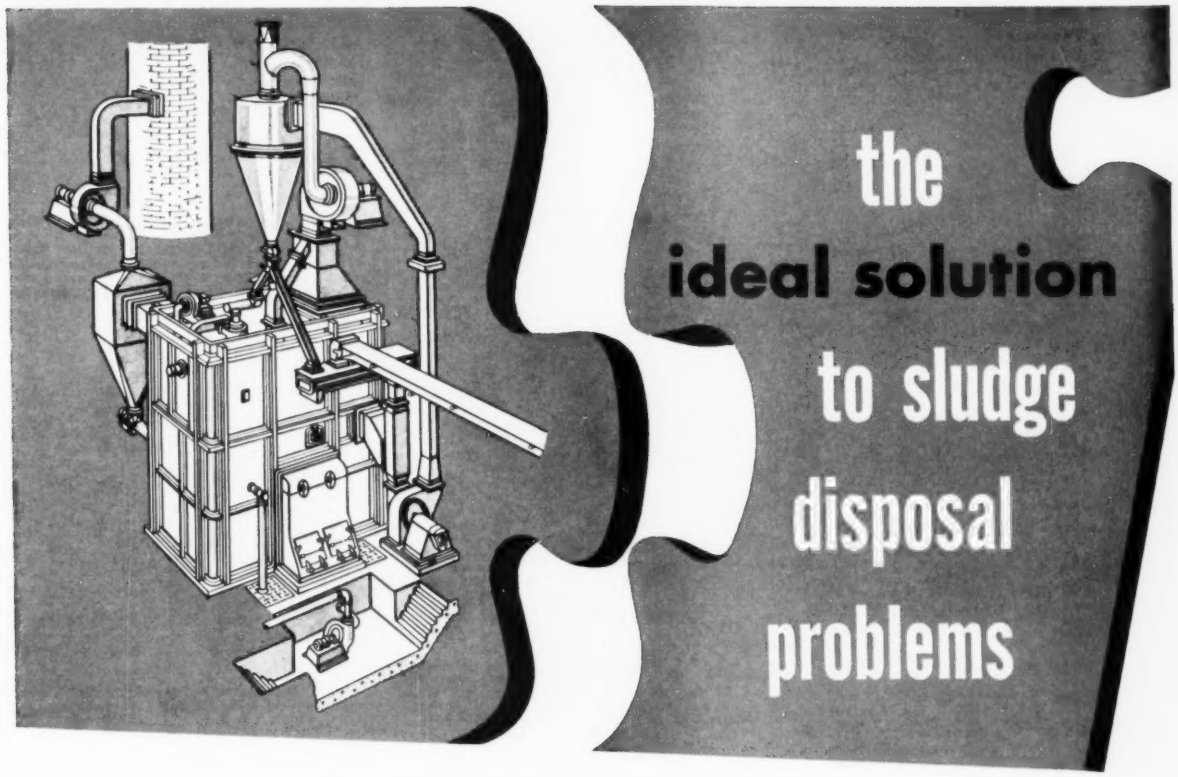


The Morris Dual-Purpose Coupling is the speedy solution to the problem of coupling or repairing cast-iron, steel, and asbestos-cement pipe. It is a split repair sleeve that is different—simple, yet basically sound. In practically every instance where Morris Dual-Purpose Couplings have been used on water lines—they sold themselves!

Write for descriptive literature and price schedule.

MORRIS

MORRIS COUPLING AND CLAMP COMPANY
P. O. Box 632 • • ELLWOOD CITY, PA.



Here is the modern method of sludge disposal – the C-E Raymond System of Flash Drying and Incineration. Continuously, automatically, this system incinerates thickened sludge to a fine ash, free from clinker and unburned materials . . . or flash dries it to fertilizer, containing all of the original fertilizer constituents.

C-E systems now in service are meeting the requirements of both large and small communities – serving equivalent populations from 14,000 to 3,600,000. The list below shows the most recent installations.

C-E Raymond Systems are flexible in layout, highly efficient and fully reliable; they provide for maximum utilization of waste heat. They mean for any community the end of stream or atmospheric pollution resulting from the disposal of sewage wastes.

The services of C-E specialists are available to help you plan for the most practical and economical answer to your sludge disposal problems. For prompt attention, get in touch with one of the Combustion offices listed below.

C-E Raymond Systems installed, under construction or on order since 1945

Installation	Consulting Engineer
Baltimore, Md.	Whitman, Requardt & Associates
Bethlehem, Pa.	Morris Knowles
Bloomsburg, Pa.	Gannet, Fleming, Corddry & Carpenter
Camden, N. J.	Havens & Emerson
Chicago, Ill. (W. Southwest)	Engineering Dept., Sanitary District
Edgewater, N. J.	McClave & McClave
Fond du Lac, Wis.	Jerry Donohue Engrg. Co.
Houston, Texas	Greeley and Hansen
Lansing, Mich.	Drury, McNamee and Porter
Los Angeles, Cal.	Metcalf and Eddy
San Diego, Cal.	Frank Currie
San Francisco, Cal.	Clyde C. Kennedy
Schenectady, N. Y.	Havens & Emerson
Sheboygan, Wis.	Jerry Donohue Engrg. Co.
Washington, D. C.	Greeley and Hansen
Waterbury, Conn.	Malcolm Pirnie
Wyomissing Valley, Pa.	Albright & Friel
York, Pa.	Albright & Friel

COMBUSTION ENGINEERING, INC.

FLASH DRYER DIVISION

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Chicago 22, Illinois

C-E

Western Office: 510 W. Sixth, Los Angeles 14, Cal.
Eastern Office: 200 Madison Ave., N. Y. 16, N. Y.

ALSO FLASH DRYING AND INCINERATION SYSTEMS FOR INDUSTRIAL WASTE DISPOSAL

Get full details of this month's new products . . . mail your Readers' Service card today.

To order these helpful booklets check the coupon on page 36.

Pollution-Proof Outdoor Drinking Fountain

144. An outdoor drinking fountain so designed that contamination by cross connections or back siphonage is not possible is fully described in a 4-page bulletin. Features neat appearance, easy installation. Write Murdock Mfg. & Supply Co., 426 Plum St., Cincinnati 2, Ohio, or use coupon.

Faster Pipe Laying With Precaulked and Threaded Joints

148. McWane 2" cast iron water pipe with threaded joints and precaulked bell and spigot pipe are described in folder WM-47. Additional data on 3" to 12" centrifugally cast pipe and fittings in folder WL-47, both issued by McWane Cast Iron Pipe Co., Birmingham 2, Ala.

Inserting Valves Without Shutdown

162. Do you have the latest data on equipment for inserting control valves where shutdown is impractical? Mueller catalogs H-20 and H-602 give all details on inserting valves and equipment, using hand-operated or power-operated machines. Get these catalogs today by checking the coupon. Mueller Co., Decatur, Ill.

What You Should Know About Meter Setting and Testing Equipment

166. Complete details on all equipment and proper methods for meter testing and installation are included in an excellent book published by Ford Meter Box Co., Wabash, Ind. All waterworks men concerned with setting and testing of water meters should have a copy of this book. Write for Catalog No. 50.

Pressure Reducing Regulator Has High Inlet-to-Outlet Ratio

172. Get full data on the 50-G2 pressure reducing regulator that permits inlet-to-outlet ratios of 250 to 2 lbs. at accuracies approaching instrument control. Bulletin G-101, available from Foster Engineering Co., 825 Lehigh Ave., Union, N. J. gives full details. Check the coupon.

What You Should Know About Fluoridation and Fluoridators

155. Two helpful publications issued by Wallace & Tiernan titled "Fluoridation" and "Fluoridators" show the development of fluoridation, list the chemicals and dosage normally used, and give full techincal data on solution feed and dry feed fluoridators. Be sure to get these publications from Wallace & Tiernan by checking the coupon today.

Helpful Data on Well Water Systems

173. A comprehensive, 48-page book on Layne Water Well Systems covers gravel wall wells, underreaming, cemented walls, rock wells and other well types. Applications of shutter screens and vertical turbine pumps are shown, together with water treatment and conditioning equipment. Ten pages are devoted to useful engineering tables and measurement data. Check the coupon today or write Layne & Bowler, Inc., Dept. PW, Memphis 8, Tenn.

Attractive Bulletin Features Large Elevated Tanks

252. In a 24-page booklet, "Horton Elevated Steel Tanks of Large Capacity," Chicago Bridge & Iron Co., Chicago 4, Ill., describes the advantages of using large elevated steel tanks to provide gravity pressure in municipal water systems. Detailed information on radial-cone tanks of 500,000 to 3,000,000-gal. capacity and Horton-spheroidal tanks of 1,000,000 to 3,000,000 gal. is included in this really handsome bulletin. Check coupon for your copy.

Water Conditioning Data Book Offered To Engineers

259. All engineers and municipal officials concerned with water conditioning will want a copy of the greatly enlarged edition of the popular Permutit Data Book prepared by the Permutit Co., 330 West 42nd St., New York 36, N. Y. This completely revised book presents a compilation of 77 tables, all valuable to the engineer. Subjects include hydraulics, impurities in water, reactions and conversions of chemicals used in water treatment, alkalinity relationships and other helpful material.

Handy Calculator for Cast Iron Pipe

175. With the handy Cast Iron Pipe Calculator you can determine at a glance the class, weight and dimensions of bell and spigot pipe. This slide-rule type calculator is absolutely free. Use coupon or write R. D. Wood Company, Public Ledger Bldg., Philadelphia 5, Pa.

Helpful Valve Catalog For Engineers

236. For complete descriptions of Darling double disc, parallel seat gate valves be sure to get Bulletin 5002 issued by Darling Valve & Mfg. Co., Williamsport, Pa. Construction details covering all valve parts and accessories are helpful for specification writers. Check the coupon for your copy.

Efficient Underdrains for Rapid Sand Filters

239. Be sure you have engineering data on vitrified clay underdrains, efficiently designed for filtering and backwashing. Check the coupon or write F. B. Leopold Co., Inc., Dept. PW, 2413 W. Carlson St., Pittsburgh 4, Pa.

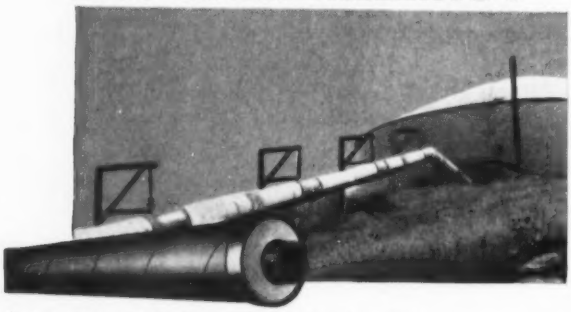
Water Lines Under Pavements Easily Installed

247. With a Trojan pipe pusher and puller no resetting of grip is required, so the work goes twice as fast. Two models, for pipe up to 2" dia. Get full details by checking the coupon. Trojan Mfg. Co., 114 Race St., Troy, Ohio.

Trencher Fits Municipal Needs

315. A bulletin describing the Cleveland Model 95 trencher has been published by the Cleveland Trencher Co., Cleveland 17, Ohio. The Model 95, called "The standard machine for city and suburban work", is versatile, manueverable and economical for use on water lines, service lines, road widening and all utilities trenching. Get this 8-page illustrated bulletin by checking the coupon.

RIC-WIL KEEPS THIS WATER LINE FROM FREEZING!



Project: Water Works Improvement; Ishpeming, Michigan.
Consulting Engineer: Drury, McNamee & Porter; Ann Arbor, Michigan.
Contractor: L. W. Brumm; Marquette, Michigan.

This overhead Ric-wiL pipe line, connecting an elevated storage tank to the distribution system, is protected from freezing even during winter temperatures as low as –40° F.!

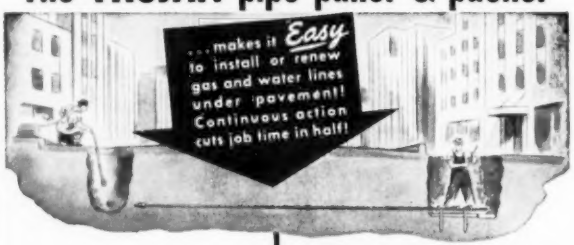
For normal flow, ample thermal efficiency is assured by using 3" thick Fiberglas insulation, with a ¾" dia. steam tracer provided for stand-by use if required.

The 12" steel water line is coated on the inside with Ricwilite phenolic resin for corrosion resistance, and the entire prefabricated system is housed inside 21" dia. RIC-WIL HEL-COR Conduit for protection against the elements.

Ric-wiL PREFABRICATED INSULATED PIPING — UNDERGROUND OR OVERHEAD

THE RIC-WIL COMPANY · CLEVELAND, O.

The TROJAN pipe puller & pusher



MODEL A for ½" to 1" pipe

MODEL B for 2" pipe and under

WRITE TODAY FOR FULL DETAILS

With a Trojan, no resetting of grip is required—job goes twice as fast. Heavy duty, all steel construction makes it 4 times stronger than cast iron pusher.

Model A needs only 5 ft. trench. One man can easily lift it in and out of trench and install the average service. 15 tons of pushing pressure possible.

Model B has 3 pushing speeds for different soils. Reversible in 30 seconds.

Double XX heavy, 30" push pipe travels straighter.

The TROJAN Manufacturing Co.
1114 Race Drive • Troy, Ohio
41 Greenway, Hamden, Conn. • Box 465, Memphis, Tenn.

CLAY PIPE is detergent-proof!

Of course it is. Clay pipe is chemically inert. Detergents can't weaken it, soften it, or separate its particles. All they can do is keep it clean.

Comparative laboratory tests show that *other* types of sewer pipe may fail, however, in contact with detergents. One non-clay material failed after only 500 hours in a *one-percent solution* of a popular detergent at "dishwater temperature." A lab technician was able to pull it apart and shred it with his fingers.

Important? You bet it is! Hundreds of thousands of gallons of detergent solutions pour into a city's sewers every day. There's no *safe* substitute for Vitrified Clay Pipe. It's the *only* chemically inert pipe . . . the only pipe that can't wear out. It stays rock-hard . . . glass-smooth . . . die-straight, year after year in the ground. *And it's guaranteed for half a century!*

NATIONAL CLAY PIPE MANUFACTURERS, INC.
1520 18th St. N. W., Washington 6, D. C.
206 Connally Bldg., Atlanta 3, Ga.
100 N. LaSalle St., Rm. 2100, Chicago 2, Ill.
703 Ninth & Hill Bldg., Los Angeles 15, Calif.
311 High Long Bldg., 5 E. Long St., Columbus 15, Ohio

ESSENTIAL • ECONOMICAL • EVERLASTING

Vitrified
CLAY
CLAY PIPE NEVER WEARS OUT!
PIPE

C-353-4

Need more facts about advertised products? Mail your Reader's Service card now.

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ACE METHOD } OFFERS EXPERT DOUBLE SERVICE

1 SEWER CLEANING

WITH MAXIMUM EFFECTIVENESS AT SAVINGS OF 60 TO 80%

MOBILIZED PIPE CLEANING, ANYWHERE ANY TIME

The fast, streamlined ACE-Method assures 100% effectiveness of your sewer lines. Trained crews, using mobilized equipment to meet every sewer condition and size plus constant supervision means a job well done every time. Before new sewer extensions or new disposal plants are built, the old lines must be first cleaned to operate at full capacity. Contact us immediately for estimate on future work . . . take advantage of ACE's skilled know-how.

2 WATER MAIN CLEANING

WITH WATER PRESSURES RESTORED UP TO 95% OF ORIGINAL CAPACITY

COMPLETE TURNKEY CLEANING JOB

ACE PIPE CLEANING CONTRACTORS, INC.
Sewer & Water Pipe Specialists
Inquire concerning water conditioning after cleaning to preserve coefficient.

Yes, ACE brings you restoration up to 95% of original capacity WITH UP TO 97% SAVINGS OVER NEW INSTALLATIONS.* Chemical and solidified deposits, turburculations and algae are removed. The results bring lower underwriter's fire insurance rates, reduced pumping costs and improved fire-fighting operations. For greater new-extension efficiency and better treatment plant operations let ACE clean the old lines NOW!

*Proof of this amazing fact upon request.

★ **CALL COLLECT, WRITE, WIRE FOR FREE ESTIMATE OR MORE INFORMATION — NO OBLIGATION. Send for Free illustrated catalog describing the ACE-Method and what it will do for you!**

Ace PIPE CLEANING CONTRACTORS, INC. ACE

SEWER AND WATER PIPE SPECIALISTS

Home Office: 3513 East 18th Street, Kansas City, Mo.

Phone CHestnut 2891 **Offices in Principal Cities**

All About Centrifugal Pumps

258. Where pumping performance counts you want to check your specifications carefully. Investigate the features of Fairbanks-Morse centrifugals. Use coupon or write to Fairbanks, Morse & Co., Dept. PW, Chicago 5, Ill.

Data on Mixers For Flocculation Tanks

265. Full data on Link-Belt Straightline mixers for flocculation tanks will be found in Folder No. 2042, issued by Link-Belt Co., Box 472, Lansdale, Pa. Layouts of typical tank arrangements are included. For your copy just check the coupon.

General Catalog on Measuring and Controlling Equipment

272. The full line of Simplex equipment for the measurement and control of liquids and gases in water and sewage plant installations is illustrated and described in detail in 28-page Catalog 003. Every engineer should study the design data in this helpful booklet. Write Simplex Valve & Meter Co., 68th & Uplands Sts., Philadelphia 42, Pa., or use the coupon.

Handy Catalog Covers All Pipe Repairs

290. A complete catalog covering repair clamps, packings and gaskets of several designs to suit all needs is offered by Smith-Blair, Inc., So. San Francisco, Calif. Directions for use show ease of application. Every water works needs a copy of this catalog for ready reference. Available by using the coupon.

●

REFUSE COLLECTION AND DISPOSAL

How to Reduce Refuse Collection Costs

123. The sequence of operations for fast loading and refuse compaction in the Gar Wood Load-Packer are illustrated and described in 12-page folder W-110, together with size data and details of hydraulic elements. Be sure to check all details of the efficient Load-Packer system. Check coupon or write Gar Wood Industries, Wayne Division, Wayne, Mich.

Efficient Material Handling to Reduce Incineration Costs

130. Blaw-Knox Buckets specially designed for refuse and garbage handling are described in 22-page Bulletin 2350. Illustrations show progress of material through a modern municipal incinerator plant. Dimensions and incinerator bucket specifications are included. Blaw-Knox Div., 2124 Farmers Bank Bldg., Pittsburgh 22, Pa.

Increasing the Efficiency of Bulk Rubbish Collection

177. Strategically spotted bulk containers can be handled by one man operating a Dempster-Dumpster equipped truck. Get full details of this cost-saving system of rubbish collection, as used by many cities to increase efficiency and eliminate unsanitary conditions. Write Dempster Brothers, Inc., 952 Dempster Bldg., Knoxville 17, Tenn., or use the handy coupon.

Save Garbage Collection In Defense Housing

181. Defense housing projects won't drain manpower for garbage collection when Westinghouse Waste-Away Food Waste Disposers are installed in each kitchen. Helpful information for community planners is offered by Westinghouse Electric Corp., Electric Appliance Div., Mansfield, Ohio. Just check the coupon.

How to Build A Sanitary Land Fill

260. Proper use of equipment and the four steps necessary to build a good sanitary fill are shown in an illustrated folder prepared by Drott Mfg. Corp., Milwaukee 12, Wisc. Check coupon today for your copy.

HERE'S HOW LOAD-PACKER REFUSE COLLECTION CUTS COSTS MORE THAN 50% in a TYPICAL COMMUNITY

In many towns with 3,000 to 6,000 population, one Gar Wood LOAD-PACKER has replaced from three to five open-type trucks formerly used for municipal refuse collection. And, in larger towns and cities, equipment savings increase in even higher proportion.

For example, consider a typical American city of 6,000 people which would average about 1,600 dwellings. A single LOAD-PACKER with a crew of two loaders and a driver can service 800 dwellings each 8-hour day. Thus it's easy to maintain a schedule of one weekly residential garbage collection, one weekly trash and ash collection and daily garbage and trash collections at commercial establishments. One day each week, too, can be reserved for general or special clean-up jobs.

Under this easily maintained schedule, one LOAD-PACKER offers better service to residents than was previously possible with a minimum of three open trucks. And extra savings are assured since there is only one truck to maintain. Labor requirements are reduced and extra manpower is made available for street maintenance, sewer cleaning or other municipal assignments.

From small towns to the largest cities—in test after test—Gar Wood LOAD-PACKERS have consistently resulted in faster refuse collection schedules with lower operating costs. *Now, put modern refuse collection to work in your community.* Mail the coupon below for valuable free information about modernizing your refuse collection system—and cutting your collection costs—with new, modern Gar Wood LOAD-PACKERS.

Gar Wood LOAD-PACKERS SAVE EXTRA DOLLARS

EQUIPMENT PURCHASE COST

with open trucks

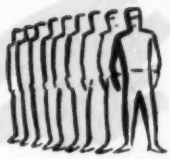
3 trucks

with LOAD-PACKERS

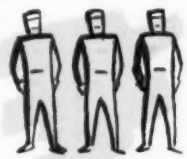
1 Load-Packer

UP TO 50% LESS

LABOR COST



6 to 9 men



3 men

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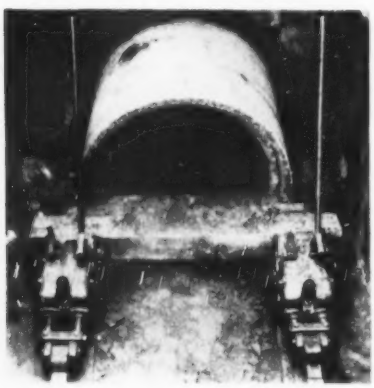

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225. To get all the benefits of mercury vapor lamp illumination, efficient transformers are required. Complete data on Jefferson Transformers for all outdoor and indoor installations is offered in 16-page illustrated Bulletin 521-5 by Jefferson Electric Co., Bellwood, Ill. Particular attention is given to street lighting applications. Get a copy now by checking the coupon.

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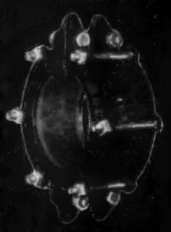

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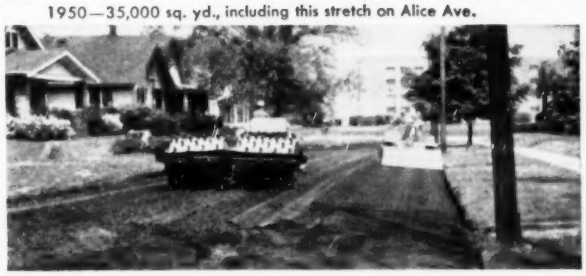
1949—Michigan Ave. was in the second year's program.

1950—35,000 sq. yd., including this stretch on Alice Ave.



1951—Paving on W. Gift St., part of 49,000 sq. yd. for year.

Like many cities, Peoria, Ill. spent thousands of dollars annually maintaining granular base residential streets. Yet because of continuing base failures these repairs proved to be temporary.

City officials sought a way to reduce this high cost. They found the answer in soil-cement.*

In 1948 they paved three blocks with soil-cement. Property owners, accustomed to ineffective repairs on dusty, potholed streets, watched operations critically. They liked what they saw.

Says Com. Pub. Wks. Ralph Metts: "We're swamped with petitions from property owners for soil-cement streets. It's difficult to keep up with them—even though property owners pay 75% of the cost. The city's 25% share is for intersections.

"In our long-range program we already have more than 160,000 sq. yd. of soil-cement streets. We plan at least 116,000 sq. yd. more in 1952."

Peoria thus joins scores of cities, counties and states enjoying economical, all-weather service from soil-cement roads and streets. Soil-cement paving is economical because most of the required material is soil already on the site. Construction procedures are fast and so simple that crews quickly master them. And records prove that maintenance costs are extremely low.

For additional information write for free literature, distributed only in the U. S. and Canada.

*Soil-cement pavement consists of a soil-cement base and bituminous surface.

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296. A report covering all developments to date on the use of natural rubber in road surfacing of asphalt highways has been issued by the Natural Rubber Bureau, 1631 K St., N. W., Washington 6, D. C. Get your copy of this 52-page booklet which includes new data on research and full reports on test roads in many states. Use the handy coupon.

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What You Should Know About Trickling Filter Underdrains

20. Specifications for vitrified clay underdrain blocks conforming to ASTM standards, suggestions for layout and construction of trickling filter floors, dimensions of standard blocks, channel covers, angles and other fittings are available from the Trickling Filter Floor Institute, c/o Editor, Public Works, 310 E. 45th St., New York 17, N. Y. Check the coupon and we will forward your request.

How Cities Clean Sewer Lines From Street in One Operation

25. In a helpful 28-page handbook of sewer cleaning methods and equipment the makers of OK Champion sewer cleaners give full details of power and hand operated models. Also included are data on expansion buckets that take dirt from sewer to street in one operation, root cutters and other accessories. Get your copy by checking coupon. Champion Corp., 4752 Sheffield Ave., Hammond, Ind.

Design Data Offered On The Spiragester

42. The Spiragester, a unit which combines the Spiraflo Clarifier and a digestion compartment in a two-level arrangement to save space and reduce construction costs, is fully described in Bulletin 124 released by Lakeside Engineering Corp., 222 West Adams, Chicago, Ill. Design details, including capacities for 8' to 24' units are furnished together with typical plan and elevation. Check the coupon for this helpful bulletin.

What You Should Know About Design and Use of Concrete Sewers

122. Every engineer and contractor should have a copy of the 48-page book "Concrete Sewers" in his library. This valuable text, published by the Portland Cement Assn., 33 W. Grand Ave., Chicago 33, Ill., gives an authoritative discussion of hydraulics, sewer design, construction and maintenance. Generous use of helpful illustrations makes the book attractive and helpful to the reader. For your copy, just check the handy coupon.

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A Handbook of Sewer Cleaning Methods and Materials

44. Complete, easy-to-follow directions for every type of sewer cleaning operations and the equipment needed for effective cleaning work is covered in a 40-page booklet issued by Flexible Sewer-Rod Equipment Co., 9059 Venice Blvd., Los Angeles 34, Calif. Full details are provided on power cleaning machines, the SeweRodeR, hand tools and all accessories. Water main and culvert cleaning methods are included. Check the coupon for your copy of this helpful handbook.

Helpful Design Data For Sewage Ejectors

81. The applications and advantages of pneumatic sewage ejectors are outlined in a new bulletin of the Blackburn Smith Mfg. Co., Inc., Hoboken, N. J. Included are piping diagrams for electrode and float switch controls plus dimensions and layouts for single and duplex systems. Get your copy by checking coupon.

Useful Data on Butterfly Valves

100. Complete descriptions and tables of dimensions on the full line of Rockwell Butterfly Valves is contained in several bulletins published by the company. Construction details and special control features are illustrated. Write W. S. Rockwell Co., 200 Eliot Street, Fairfield, Conn.

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107. Troubles caused by roots and corrosions in house connections can be eliminated by the use of root-proof Bermico sewer pipe. Full details on this smooth, waterproof, tight-sealing pipe available by checking the coupon, or write to the Brown Co., Dept. PW, 150 Causeway St., Boston 14, Mass.

Data on Rotary Distributors For Sewage Treatment

118. Data on Infilco rotary distributors which feature low head requirements, uniform distribution, streamline design, double seal against sewage loss, and corrosion resistant construction, will be found in Bulletin 6400. For your copy, use the handy coupon or write Infilco Inc., Box 5033, Tucson, Ariz.

Helpful Data on Sluice Gates

158. In a well-organized 48-page catalog you will find complete engineering and design data on Pekrul sluice gates, headgates, automatic flap gates, lifts and accessories. Numerous models in 6" to 92" sizes are available, and all pertinent data will be found in this helpful booklet. Write Morse Bros. Machinery Co. Denver, Colo., or use the coupon.

Design Data for Insulated Piping

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Complete Catalog for Engineers Shows Water and Sewage Plant Equipment

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Efficient Blowers for Activated Sludge Plants

232. Many advantages of Roots-Connersville positive displacement rotary blowers are described in Bulletin 22-23-B-13, which also provides characteristic curves for operation with constant speed, multi-speed and variable speed motors and details of several types of blowers. Get this helpful bulletin by checking the coupon. Roots-Connersville Blower Corp., Connersville, Ind.

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37. How to make a better sewer pipe joint of cement—tight, minimizing root intrusion, better alignment of joint. Permits making joints in water-bearing trenches. General instructions issued by L. A. Weston Co., Dept. P.W., Adams, Mass.

How Vacuum Filters Help Your Sewage Sludge Disposal

209. Applications of the Conkey sludge filter to all types of sewage sludge are described in Bulletin 100. Tables show filter sizes, weights, and give anticipated average results. Use the coupon to order your copy. General American Transportation Corp., Process Equip. Div., New York 17, N. Y.

How to Dispose of Sewage and Industrial Sludges

281. Get full information on the C. E. Raymond System of combined incineration and sludge drying providing high temperature deodorizing for nuisance-free sludge disposal. Flexible layouts fit large and small communities. Use handy coupon or write Combustion Engineering Inc., Flash Dryer Div., 200 Madison Ave., New York 16, N. Y.

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Complete Data On Sludge Pumps

193. Sludge pumps, simplex, duplex, triplex and quadruplex, normal and heavy duty models, are described in Bulletin S48 issued by Marlow Pumps, Ridgewood, N. J. Check the handy coupon for your free copy.

Porous Media Handbook For Sanitary Engineers

222. A really helpful 56-page booklet just published by the Carborundum Company tells the complete story of the use of porous media in the fields of water and sewage treatment. The major portions are devoted to water filtration and air diffusion for activated sludge treatment. Diagrams show the many installation methods used, and full data is provided for the designing engineer. General data and specification sections complete this valuable reference bulletin. Get Form 5118 by checking coupon or write The Carborundum Co., Refractories Div., Perth Amboy, N. J.

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How to Compute Quantities of Jointing Materials

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Reference Book on Lubricated Plug Valves

273. Lubricated plug valves, including stick-proof lever sealed valves for easy operation and positive mechanical seal are fully described in reference books issued by Homestead Valve Mfg. Co., Box 550, Coraopolis, Pa. Check the coupon for your copy.

BUSINESS AND ADMINISTRATION

How to Save On Automobile Insurance

208. Employees of the municipal, county, state and federal governments should investigate the savings on automobile insurance available to them through Government Employees Insurance Cos., Govt. Employees Insurance Bldg., Washington 5, D. C. Check the coupon for details.

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293. The benefits of two-way radio communication in the uncongested non-interference 450-megacycle range make full information on this subject important to all engineers. Get full data on trouble-free systems from Motorola, Inc., Dept. PW, 4545 Augusta Blvd., Chicago 51, Ill. Just check the coupon.

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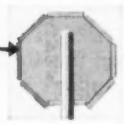

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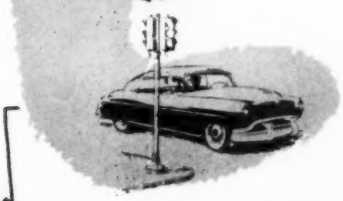

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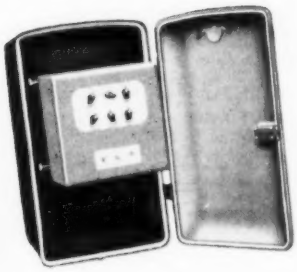

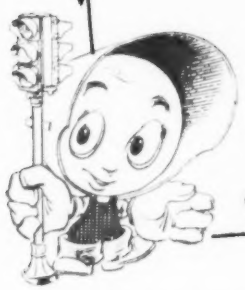

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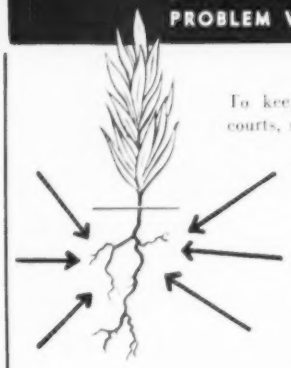

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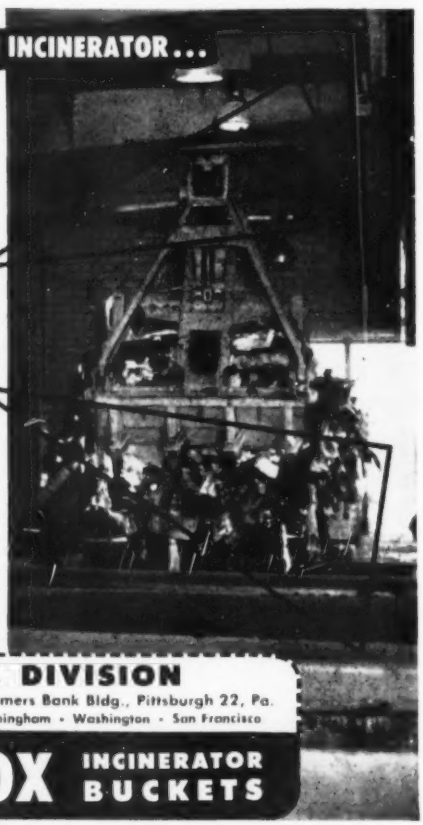

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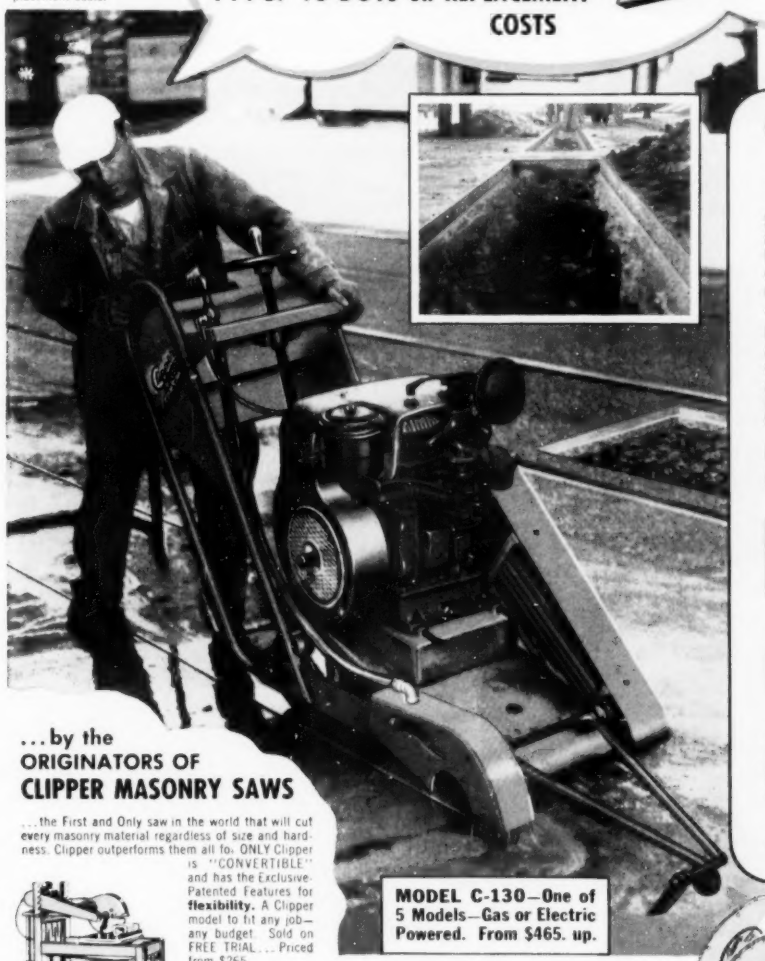

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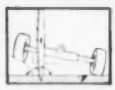

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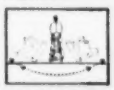

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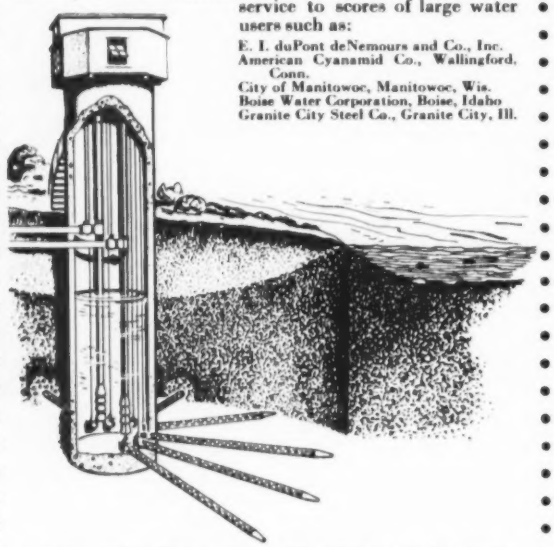

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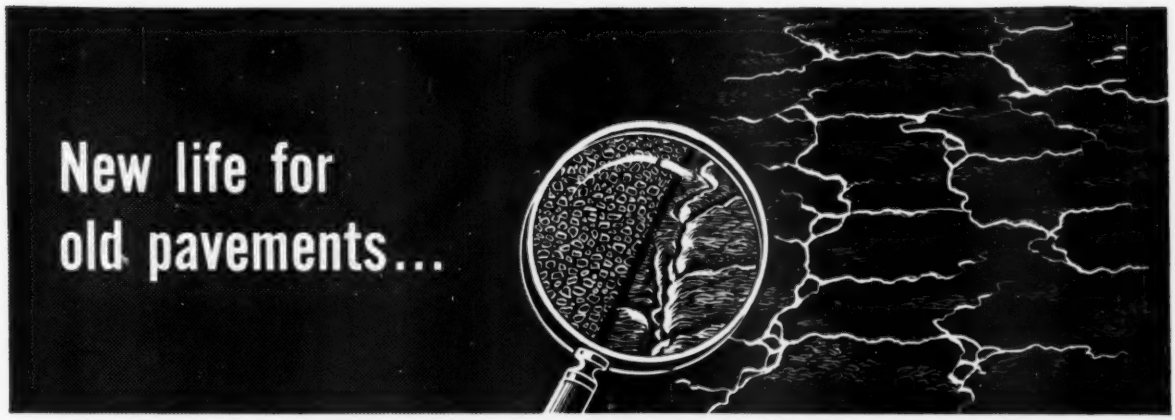

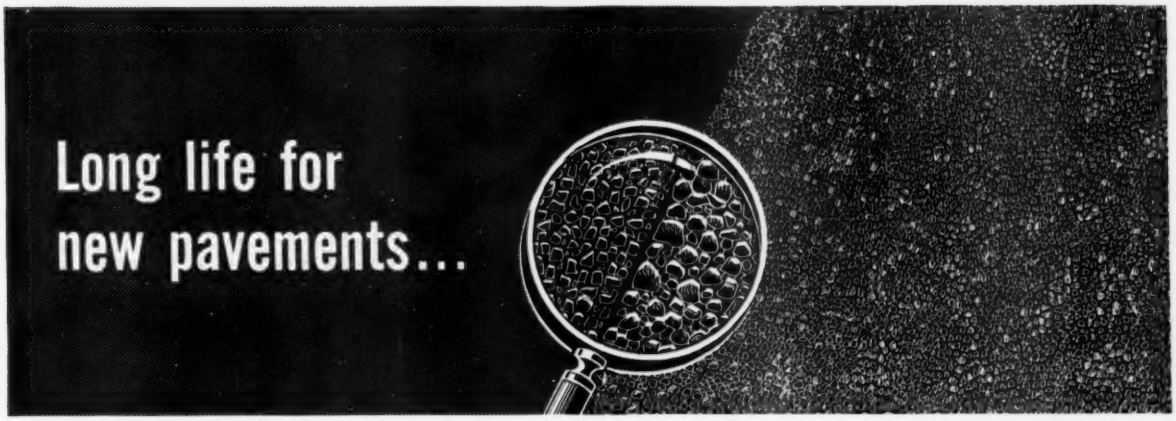

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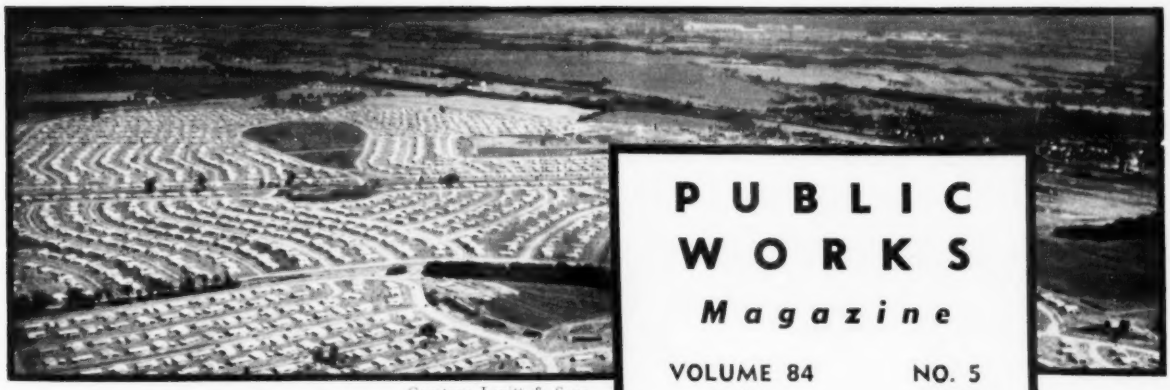


PUBLIC WORKS Magazine

VOLUME 84 NO. 5
MAY 1953

Courtesy Levitt & Sons

● AIR VIEW of Levittown, Pa., showing the layout of the community developed there.

16,000 Meter Settings in a Hurry

Levittown, now building in Bucks County, Pennsylvania, is a precedent-breaker. When 16,000 homes are built as one project, the old way of one's and two's and even hundreds becomes too slow and expensive. When mains and service lines must be laid in spinach fields with only surveyor's stakes to mark the streets, mistakes and poor methods become costly. When 40 new houses are being finished and occupied every working day, the water must be there waiting. In this timely article Mr. Hubbard describes one phase of this record-breaking work, the installation of the meter settings at the curb line.

ROBERT L. HUBBARD

WHEN the United States Steel Corporation decided to build the new Fairless Plant on the west bank of the Delaware, they set into action a lusty tide of free enterprise. A half-billion dollars worth of piers, blast furnaces, rolling mills, coke ovens, and open hearths need men to run them, who, with their families, must live near-by. Added to this, many new plants are springing up in the area to supply the Fairless or to use its wares. Men work for these plants and, with their families, want to live near them. All these folks need and demand the manifold services Americans have become used to: Laundries, filling stations, super-markets, garages, doctors, lawyers, merchants, chiefs . . . these too need homes. Homebuilders need homes. All need steel. Round and round it goes!

A measure of the extent of such a tidal wave of growth is best shown thus: Six thousand men will be needed to run the Fairless Plant itself. At present count, housing has been planned for a population growth in the area of over 75,000; and the end is not in sight.

It was natural and logical that the community building firm of Levitt & Sons Inc. should be interested. They had built homes in great numbers and had confidence in themselves for the job. They knew what Mr. and Mrs. America wanted, could afford, and would buy. They soon owned 5,000 acres of land!

The Levitts are perfectionists in their own work: they expect — and get—perfection from the people who work with them. They expect the impossible because they themselves constantly accomplish the impossible. I suppose thousands of times they have heard, "You can't do that," or "Preposterous"; but by Christmas, 1952, 3250 families had moved into Levittown, nine months after ground had first been broken.

My Company is the General Contractor for the Levittown water distribution system. The Levitts (perfectionists on water systems also) expect the impossible from my organization. Of course, only time will tell, but it is my considered opinion that few water systems are better engineered than this one.

Much thought was given to the water meter installations. The Levittown houses are built on poured concrete slabs; there are no basements. Every square foot of inside space is carefully planned and allotted—even the oil burning furnace is in the kitchen, a white enameled fixture beside the washing machine. Where was the space for the water meter inside the house? There was none.

At the curb line, between the walk and the street, was the logical spot where the meter could be read at all times, changed without messing up the customer's home, and would be free from tampering or hot water damage.

The Levitt perfectionism is particularly apparent in their landscape work; top soil is regarded as a treasure, and any grading ends up with all the top soil on top. Every plot of land is fully planted with trees and shrubs; lawns are sown with Scott's best seed. A meter box lid has to be exactly at final grade; too high, it is an eyesore and a danger; too low, it makes the meter setting a catch basin. It seems to me that the Levitts can see a mis-set

● **FIRST STEP: The loop is uncovered and an excavation made for the box. This picture shows the yoke ends joined by a frangible nut ready for breaking.**

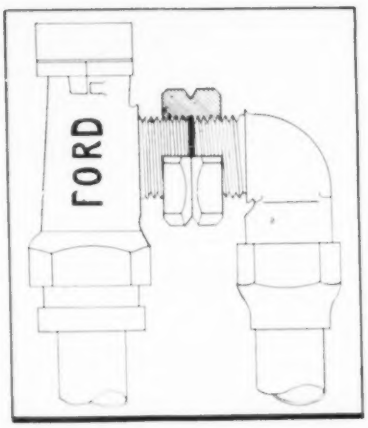
● **SECOND STEP: After water is shut off, the nut is broken; the yoke valve and outlet ell are pulled apart and the yoke piece is inserted in place.**

● **THIRD STEP: The water meter is placed and water turned into the pipe.**

● **FINAL STEP: Tile box is placed; the cover is set and the area backfilled.**

meter box at ten thousand yards!

So this was our problem: We had to run our mains and service lines in a spinach field, taking the service line into the corner of the staked-out house slab; this was to be accomplished before any grading was done, working entirely from stakes and grades. Three months later we had to come back to set the meter when streets, gutters, and curbs were in, and after grass seed was planted. In that time almost anything that could happen had happened to the street. The sewers and laterals were installed; street



● **A "frangible" nut and how it works.**

grades dozed out; curbs, gutters, pavements, and walks installed; all this was done while dozens of different trades built houses. This period of organized confusion was no time for a meter box to be sitting at the proposed curb line!

We had done most of the Long Island Levittown water distribution system, and we had learned. First step in our education was that the *wrong* time to place a meter box was when the service line went in. What a dozer can do to a nicely-set meter and meter box is not printable. A Transit Mix concrete truck

backing over soft ground can push a meter box down—and deep. We soon gave that up. Something better was needed.

Next we tried putting in a curb box and curb stop valve at the surveyed spot. That was a little better; the dozers were not quite so vicious with a cast iron curb box as they were with a terra cotta tile. We also had trouble in locating the curb stop when the curb box had been dozed away. (Remember that we were now coming back for the final meter setting after grading, planting and seeding.) When we dug up ten feet of newly planted hedge to find the curb stop, the Levitts were not amused.

In planning the new Levittown, Pennsylvania, work, we had our former experience to go on. We knew that the meter and meter box should not be set until the final grading was done. We knew there was no reason for having two curb valves in the line, one below the curb box and one in the meter yoke. We knew that sometimes the initially-set curb valve was very hard to locate indeed.

The Frangible Nut

We think we have come up with a solution to the problem good enough to be worth passing on to others; that is the reason for this article. The answer is simple, the work easily accomplished. So far as I know this is a new sequence of steps and I shall describe them.

We trench for the mains usually before the streets are rough graded, using the surveyor's stakes and grades. Mains are laid, the corporation cock tapped in, and the service line run to the indicated spot beside the staked-out house slab. The proposed curb line is marked before we get there and it, as well as the finished grade, can usually be depended on.

About a foot in from the curb, on the house side, we bend up the copper and make a loop. At the exact center of the proposed meter box location, we cut the copper tubing and install both ends of the yoke without the actual yokepiece in place. The Ford Meter Box Company made up for us some cast iron nuts with which we screw the inlet yoke valve and the outlet ell together. It is a simple nut, but with a deeply-recessed annular groove cut in the center of the outer perimeter. The two nose pieces of the yoke ends meet in the center of the nut, which is made water tight with a gasket. A nut is shown in the appended drawing and is easier pictured than described. When the Ford Company billed them to us, they called them "Frangible Nuts". I looked up that word and found that it was a sixty-cent, college version of "breakable".

This breakable nut temporarily takes the place of the yoke piece and meter. The yoke valve is left open; and the assembly—valve, breakable nut, and outlet ell—is buried with the remainder of the service line. The assembly becomes the top of the loop and has about a 16-inch fill over it. From the loop, the rest of the service line is run to the house slab. There the tube is cut and pinched together to keep out dirt. This work constitutes our entire operation prior to the building of the house.

We then move on, usually not returning to the location for about three months. Meanwhile the house is built, the other utilities run, the street paved, and the plot graded, planted, and seeded. The house plumbing is tied onto the end of the service line and the main put into use. The house is now ready for occupancy and is usually being lived in before we come back for the next step.

Installing the Meter Box

When we come back to install the meter box and meter, a pipe locator indicates the position of the buried loop at the proposed meter location. The loop is uncovered and excavation made for the 18″ x 36″ concrete tile. At this point we knock on the front door and tell the housewife that the water will be off for five to ten minutes. The yoke valve is then closed. A chisel is placed in the annular groove cut on the outside of the breakable nut, and a sharp rap of a hammer breaks the nut into two pieces. These pieces are unscrewed and thrown away. Next the yoke valve and outlet ell are pulled apart and the yoke piece inserted. The worker now sets the tile, being careful that the yoke is carefully centered. He clamps the meter into the yoke. At this point the water can be turned on again. Now the cover is set on the tile and the backfilling and tamping is done. There is usually some settling around the tile after the first few rains; we refill such as required.

I wish I could claim that we always find the loop in exactly the right place for the meter box; but I cannot. In a small percentage of places, the loop is at the wrong place—too near the curb or too near the paved sidewalk. If we cannot twist the copper loop where it belongs, we usually freeze the service with dry ice and alcohol—it takes but a few minutes—and place the loop where it belongs.

Conclusions

Usually when we change methods of operation we like to wait a few months and then assay pro's and con's of the new way. It has now been more than a few months since we started in breakable-nut procedure and we feel that a fair judgment can be made.

Here, then, is a list of the advantages we have found for the "frangible nut" method:

1. Material is saved. The formerly-used curb box and curb stop is eliminated.

2. Labor is saved. The meter setting is almost never damaged after installation. The expense of resetting the meter box to grade is nil.

3. Public relations are improved. A brand new home owner is very sensitive for his new lawn and planting. The revised meter-setting procedure disturbs these features but little.

Courtesy New York Times

● **A CITY NOW: Street scene after completion and clean-up of work.**

CONSTRUCTION EQUIPMENT FOR A Modern Water Department

HENRY GRAESER
Assistant Superintendent,
and
J. D. HENRY,
Supv. of Water Distr.
Water Department, Dallas, Texas

Photos by Jimmy Bragg,
City Photographer

IN a city where some ten thousand new homes are being built each year—and have been every year since the end of the war—timely extension of water mains and sewers and the construction of feeder and relief lines have been a problem. As a result, we have built up our equipment list and have developed new equipment to meet our special needs. This article describes major equipment we are using and, so far as is possible, tells what kind of work each type of equipment has been especially valuable for.

Distribution Division

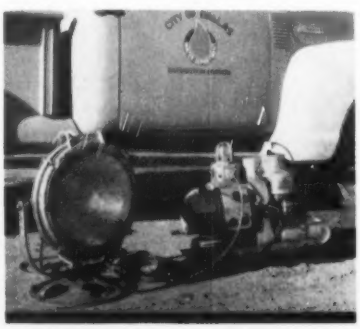
Our basic units of equipment are our water main repair and maintenance trucks. We have attempted to make each of these units self-sufficient within the limits of economic reason. One of these fleet units is shown in Fig 1. Each of the trucks is equipped with an air compressor, which is mounted across the truck bed back of the cab. Presently all of our trucks carry a 60 cfm compressor, but future purchases will carry 105 cfm compressors on emergency trucks used to repair main breaks. This will permit use of an air-driven sump pump at the same time that a paving breaker or clay spade is used. The units normally employed for setting meters and services can do quite well with the smaller 60 cfm compressor.

Each truck has a pneumatic tamper, a clay spade, a paving breaker and an air-driven sump pump. Other air tools are also provided, as required, including air driven calking tools and an air drill which is used for cutting cast iron pipe, principally of the larger sizes. Holes are drilled around the circumference of the pipe at the cut-off line and tapered wedges are driven into the holes, causing a clean break along the drilled line.

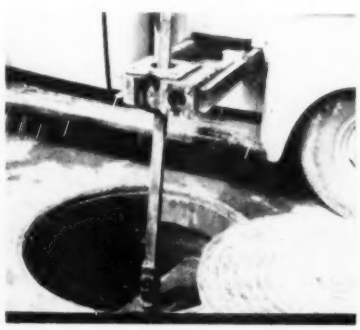
Also available, as required, are portable light plants. Unfortunately, you can't quit a main break job when the sun goes down, so we provide an ample number of lighting units, such as the Homelite 2500-watt generator shown in Fig. 2.

Of a different type are the valve trucks. These are the first order of call when an emergency occurs. Driven by a power take-off from the truck, the Payne-Dean valve operator shown in Fig. 3 is a piece of equipment which we have cause to be thankful for quite often. When a 30-inch main breaks, and you are 150 turns or more from closure, visions of much property damage float before your eyes. These power-driven operators count the turns for you and insure minimum closure time. Again, during periods of peak demand when our two ground storage reservoirs at opposite ends of the city get out of balance, the ability to "twiddle and squeeze" 48-inch and 36-inch valves quickly and

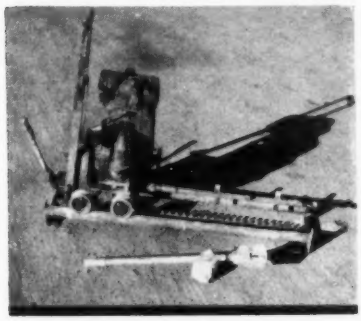
● **REPAIR TRUCK used by the Distribution Division, with air tools. (Fig. 1).**



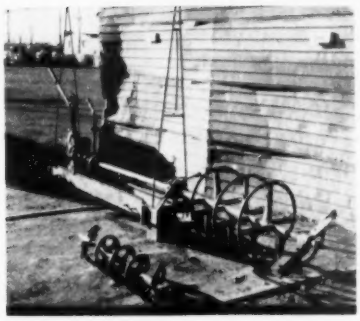
● **YOU CAN'T quit a main break job when the sun goes down. (Fig. 2).**



● **WHEN A BIG valve has to be closed in a hurry this helps. (Fig. 3).**



● **SPECIAL BIT** speeds up boring in rock formation under pavement. (Fig. 4).



● **HEAVY-DUTY** reamers are used with this earth-boring tool. (Fig. 5).

● **WET TAPS** up to 24-inch are made with this tapping machine. (Fig. 6).

easily is a real Godsend. Any city that has valves 18-inch or larger in its system should certainly investigate this equipment.

In Fig. 3 note also the permanent installation of a valve stem extension rod on our larger valves. The valve pictured is a 36-inch horizontal gear-operated valve with 235 turns. The pits for these valves sometimes become flooded. After fishing for the operating nut for some minutes after a 30-inch main had broken, our distribution supervisor decided to make certain the operating unit could be quickly found on all of our major valves. As the photograph shows, an ordinary valve key is held in place by a brace across the manhole and an operating nut has been welded to the end of the key.

Boring to Install Lines Under Pavements

It is a costly job to lay water mains and sewer lines under pavements, and to install the necessary service connections to homes on the other side of paved streets. This problem is more difficult in the Dallas area because the top soil is underlain at 2 to 10-ft. depth by an Austin chalk rock which extends over much of the city area. Earth-boring machines like the Lube-Jack Model 40 Earthworm, shown in Fig. 4, and the heavy-duty Hydrauger, shown in Fig. 5, have been found indispensable in these operations. We often drill under 40 to 50 ft. of paving for service lines with our Lube-Jack machine to set up service on the opposite side of the street. What normally would be an expensive and lengthy job is accomplished in the matter of a few working hours with a crew of three or four men. Well-trained men are essential, however, and each job must be cleared with the office for the location of other utilities. In fact, there are often locations where boring is not feasible because the under-street area is cluttered with other utility lines.

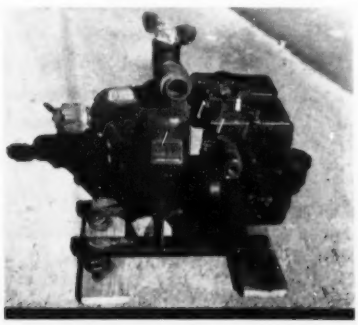
The special boring bit shown on the Lube-Jack machine, Fig. 4, was developed in our shop. It has shown superior ability in boring the chalk rock so often encountered in our city. The reamer for the Hydrauger, Fig. 5, was also built by our shop mechanic to replace the original unit purchased by us.

Tapping and Leak Locating

Every Water Department, of course, has a tapping machine. In Fig. 6 is shown a Mueller Model CC machine with a tapping sleeve and valve. We have made wet taps up to 24 inches in size in Dallas. We count reasonable extra expense to avoid shutdown of mains a good investment. For this same reason, we employ Dresser bell clamps for repairing joint leaks on large mains to avoid interruption of service and disturbance of other joints in the line. It has generally been our experience that a shut-down to repair one joint leak in a big line brings on several more joint leaks. Added to the desirability of maintaining the line in service is avoidance of possible contamination when a large line is taken out of service in a rolling terrain.

Pipe location and leak detection are constant problems in every water department. We maintain one special crew which does nothing but locate leaks in the system. Also, a pipe locator is assigned to each of our valve and service trucks. In all, we have 15 Universal pipe locators and leak detectors, three M-Scopes and one Goldak. In the photo below (center) a crew is shown using the Goldak locator to find a main needing repair.

Despite the air-driven pumps available on our water main repair and construction trucks, some additional small-capacity units are always required. In Fig. 7 is shown a 1½-inch Gorman-Rupp which was recently purchased. Larger sized units are utilized by our Sanitary Sewer Division which is not so



● **ENGINE-DRIVEN** centrifugal pumps are used in repair work. (Fig. 7).

● **PIPE LOCATING** and leak detection are constant jobs for water men.

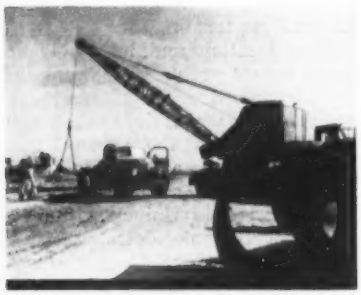
● **TRENCHER** speeds up sewer work in chalk rock section of Dallas (Fig. 8).

● **LAYING water main in a new residential area of the city. (Fig. 9).**

fortunate as to be able to valve off the flow when emergency repairs must be made. We find this small unit highly useful in pumping out flooded meter vaults and valve vaults.

Construction Division

We maintain a reasonable construction force for emergency construction and for short extensions which are not attractive to municipal contractors. Fig. 8 shows a Model 160 Buckeye ditcher cutting a sewer



● **MOBILE MOTOR crane with 3/8-yd. bucket "finds constant use." (Fig. 10).**

trench in a typical chalk rock area. We have both ladder and wheel type ditchers. In addition to the 160 Buckeye, which is ladder type, we have a Type 12 which is wheel type; and also a Parsons 200 and a Buckeye 11. The ladder type machine can cut a 14-ft. trench while the wheel machine is limited to a 5½-ft. cut. The wheel type is more suited to cutting rock, but cannot cut to the depth required for sewer work. Rock cuts can be made at a rate of about 100 ft. per day on a 14-ft. trench with the ladder-type machine and at about double this rate for a 5-ft. trench with the wheel-type machine. In dirt, the 160 Buckeye will cut about 300 ft. per day, and the wheel-type about 1,000 ft. in a clear area where there is nothing to interfere.

For clean-up work and for backfilling on water and sewer jobs, the light Fordson unit with a front end loader and the heavier Hough end-loaders are used to considerable advantage. The Fordson tractor is also used around our plant sites to pull gang mowers and to do light bulldozing and levelling operations. The Hough loaders, of which we have two, can be used to advantage on pipe-laying jobs, as shown in Fig. 9. The ditching machine in the background in this illustration is a rented one. In addition to the two Hough loaders, we also have two Fordson units.

In a system where more than 100 miles of new lines are being laid each year, a main sterilizing unit finds applications other than as an emergency tool. We recently purchased a Wallace & Tiernan emergency chlorination unit which is mounted on a trailer. This is a valuable addition to our line of equipment. In the event of floods or similar emergencies, its value in a water system the size of ours is, of course, evident. It is our understanding that the City of Fort Worth found a similar unit of inestimable value during its recent flood.

● **SEWER CLEANING is part of our preventive maintenance. (Fig. 12).**

● **HYDRA-LIFT is flexible and well suited to speeding up work. (Fig. 11).**

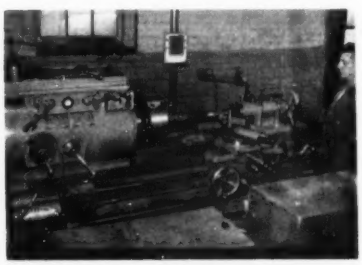
Our P&H mobile crane is shown in Fig. 10. Utilizing a ⅜-yd. bucket as well as a backhoe attachment, it finds constant use in our construction program. Its mobility, coupled with its ability to meet most every lifting requirement and to do maintenance excavation economically, makes it a piece of equipment well worth the investment it represents. There are few working days—or week-ends, for that matter—that one of our divisions doesn't have a job for the P&H.

A recent addition to our construction equipment is the Pitman

● **EMERGENCY truck carries all the equipment for quick service. (Fig. 13).**

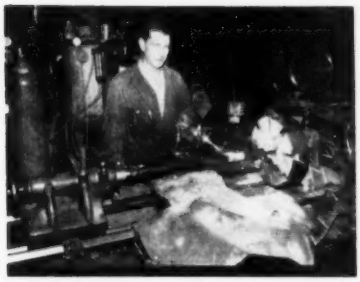
Hydra-lift hydraulic crane which is shown in Fig. 11. This is capable of lifting 4,000 pounds at a 20° angle on a 17-ft. boom. We made an error in considering flexibility as being too valuable when we mounted this crane on a short-wheelbase truck, however, and find that the outrigging necessary to utilize the full capacity of the crane outweighs the advantage gained in maneuverability. We have found the Hydra-lift to be a flexible piece of equipment, well suited to speeding up our pipe-laying operations.

Compressed air, of course, is a "must" for construction work, especially in a rock area. We have air



● **LATHE is valuable in emergencies and for planned maintenance. (Fig. 14).**

compressors mounted on trailers in sizes from 105 to 210 cfm which are used by our construction forces. We have trailer-mounted compressors by Sullivan, Ingersoll Rand, Joy, Jaeger and LeRoi; and, in addition, we have the smaller truck-mounted units mentioned.



● **METALLIZER extends the ability to build up and replace parts. (Fig. 15).**

In addition to its normal water works duties, the Dallas Water Department is responsible for sanitary sewer construction and maintenance (and sewage treatment plant operation, as well). Fig. 12 shows the type of sewer cleaning equipment used by our department. Both the SeweRodeR and the bucket-type machines, as manufactured by Flexible are used and well-liked by the Department. With such equipment, an extensive preventive maintenance program can be and is carried on to avoid costly stoppages and overflow. The SeweRodeR can clean easily and effectively lengths between manholes up to 500 ft. The bucket machine is used to work across distances to 750 ft.; but both these machines are capable of covering even longer distances. However, we find these distances are the most practical for ease of operation and long life of equipment.

Four crews in our Sanitary Sewer Department provide 24-hour emergency service. Their trucks are radio-equipped to offer immediate service in any part of the city where trouble is encountered. While we do not work on private property, citizens are encouraged to call us when trouble occurs so that we can diagnose the problem and advise if the services of a plumber are required.

If the trouble is partly in the lateral or in the main line, the stoppage is cleared by the emergency crews. These crews are equipped with flat steel plumber's tape or wooden coupled rods for house lateral work, and with Flexible rods for main line work. The flexible rods are operated by hand on the emergency trucks, but power units are available when difficult jobs are encountered. We are now considering purchasing small power units to be mounted on each emergency truck and we believe this will speed up the work. A crew at work is shown in Fig. 13.

There is always something to be fixed around a water department and, quite often, something to be made. We have invested in a complete maintenance machine shop which enables us to handle most any type of repair to pumping equipment.

Our newest lathe, which was purchased last year, is shown in Fig. 14. With this, and with others we have, we can handle shafts for our largest pumping units and also pump impellers up to 20 inches in diameter. The jobs that our machine shop is called on to do vary from emergency requests to manufacture a new pump shaft to minor repairs to small valves. An example of the values of trained men and efficient machines to do almost any

● **CURB CLIPPER saves 32 manhours a week in grounds care (Fig. 17).**

job was highlighted recently when a shaft failed on one of our major sewage pumping units. Delivery on this particular shaft was quoted as four months—but our machine shop built one from shafting stock in two days, and at a saving of more than $150 on materials and working time alone. We have experienced like emergencies on water pumps and, where service was jeopardized, have made pump shafts overnight.

Aside from the emergency picture, the ability to overhaul pumping units on a planned maintenance basis in our own shops well justifies our investment.

Welding Equipment

Welding equipment is a must for every water department. In our shop we have a 250-amp General Electric welding unit. For field and plant work we have a portable trailer-mounted Lincoln welding unit of 200-amp capacity.

A most valuable piece of equipment is our Mogul Model F-10 metallizing gun, shown in Fig. 15. In this photo, the machinist is shown coating an ordinary piece of steel

● **MANHOLE cover lifter knocks down for easy transportation. (Fig. 16).**

bar stock with yellow brass. The gun will apply aluminum, stainless steel, hard bronze, lead, copper and a number of other metals. It is employed, for the most part, to build up wearing rings on pump impellers and steel shafts on pumps and motors. Packing grooves in bronze bushings on pump shafts are built up on the shaft and then turned down to original diameter without necessity of replacement. Stainless steel shafts without bronze sleeves are likewise built up with stainless steel and turned down in the lathe, avoiding costly replacement of the shaft.

We find many other applications for metallizing, such as coating chemical equipment parts with copper, stainless steel or other suitable corrosion-resistant metals. This particular piece of equipment recently paid for its cost in overhauling the four-way control valves on the oldest section of our filter plant.

Equipment We Devised

Quite frequently equipment requirements are solved by the ingenuity of our own personnel. Fig. 16 shows a manhole lifter devised by our shop foreman. The 42-inch manhole covers employed in our larger water system valve manholes posed quite a problem for valve men when emergency closure was required, since these covers weigh about 600 pounds each. The simple lever shown in the photograph can be knocked down to fit into its allotted space in the valve foreman's pick-up truck. This is another gadget which pays when time is of the essence.

In Fig. 17 is shown a homemade curb clipper built by our plant mechanic at the sewage treatment plant. This unit, built from left-over parts for less than $100 saves about 32 manhours each week in clipping around trickling filters and settling basins at the sewage treatment plant.

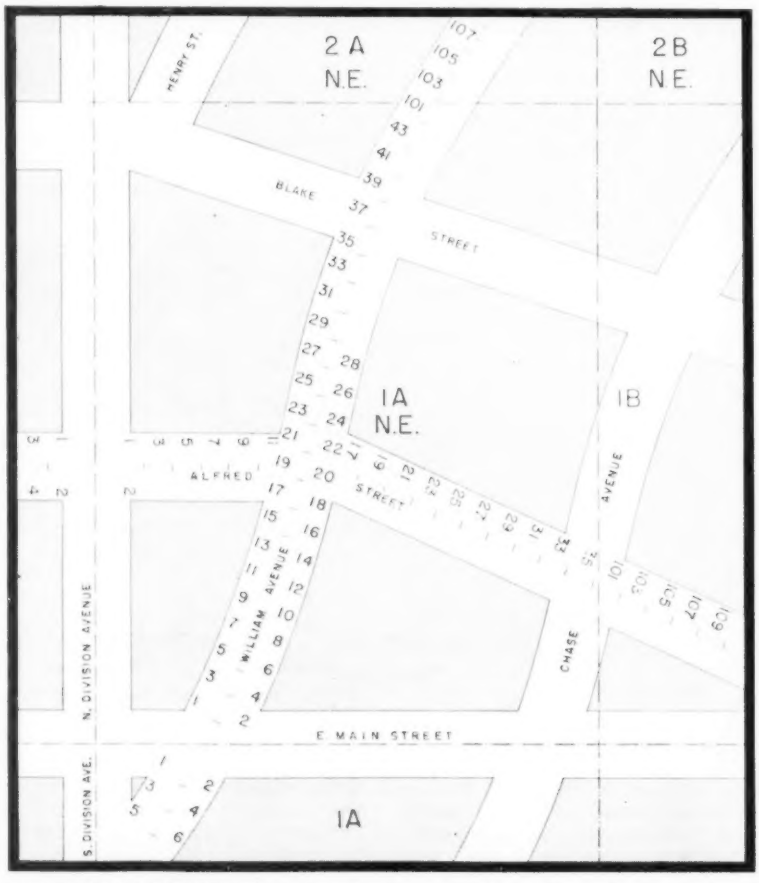
Street Naming

THE practically universal method of designating buildings or properties in any but the smallest communities is by street and number. This not only identifies the property, but also can be used to give its location, which is important in facilitating the business and social life of the community. But the possibilities in this respect are far from being realized in most communities. One of the irritations of urban life is waste of time and loss of patience resulting from unsystematic and haphazard house numbering and street naming. A method of street naming which gives no clue to the section of the city in which to look for a given address slows down the governmental and business operations of a city. As an illustration, if you wish to call at 327 Dray St., you first must find where Dray St. is. Several inquiries may fail to enlighten you. A street directory may inform you that it runs from Swan St. to Smith St., but if you do not know where *they* are you are little better off, and you may have to resort to careful, time-consuming examination of a map of city.

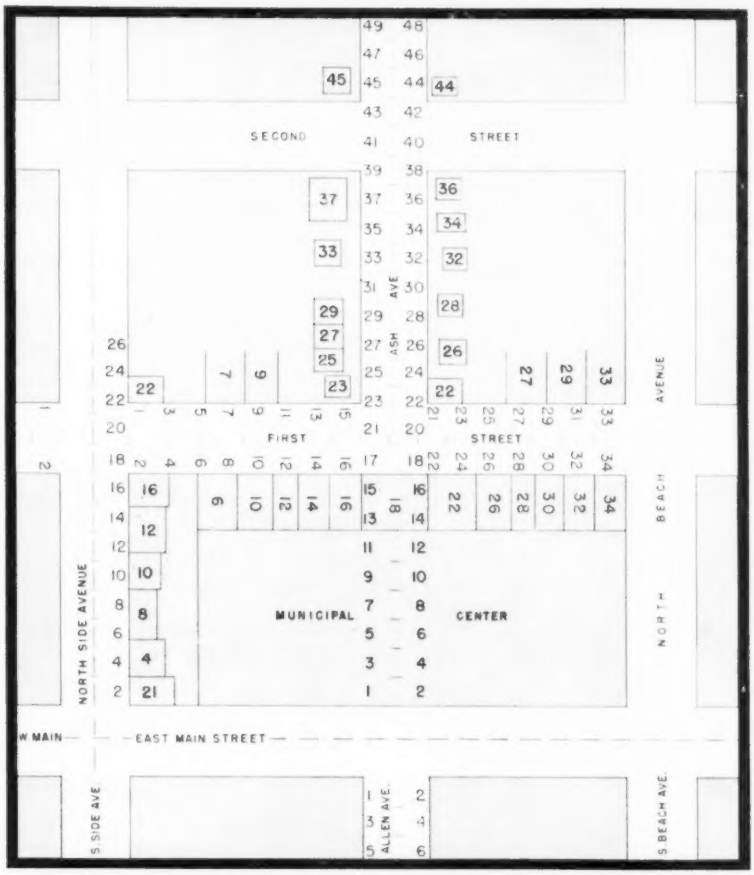
Yet it is easy to devise a system of street naming and house numbering whereby any address can be located quickly on a map or on the ground. Some cities have taken a step in this direction by dividing the city into quadrants by N-S and E-W axes and appending NE, NW, SE or SW to every address, thus reducing the uncertainty of location 75%. This is the method adopted for Washington, D. C., where the axes intersect at the Capitol. N. Capitol and S. Capitol Sts. forming one axis, while East Capitol and a line due west to Washington Monument form the other axis.

Street Naming

The axis idea only partly solves the problem; but it forms the basis of most other systems. One development is to designate all streets running in a given direction, say north and south, as "Avenues"; and those running at right angles to those are called "Streets". Diagonal streets are designated by other names, as roads or boulevards. This further bisects the problem. It can almost be eliminated by selection of the names of the streets. The simplest method of doing this is by numbers. Thus Third Ave. N.E. is the 3rd street east of the N-S axis. Fourth St. S.E. is the 4th street south of the E-W axis. The axis streets can be given non-numerical names, as Main Street, Division Ave., etc. Or the distance of streets from the axis can be indicated alphabetically, as Adams, Beacon, Concord, Davis, Elm, etc. Further aid is obtained by using different classes of names on opposite sides of each axis. Thus avenues east of the N-S axis could be given names of persons — Adams, Blake, Christopher, Daniel, Edward; those west, the names of trees or other objects—Ash, Beech, Chestnut, Dogwood, Elm, Fir, etc.; and streets north of the E-W axis be similarly distinguished from those south of it. Even a stranger to the city would quickly learn the system. If he is looking for Oak St. and knows Beech St. is north of the axis, then he at once knows that Oak St. is the 15th street north of the axis.



● **TYPICAL RESIDENTIAL** section showing a portion of the north-east quadrant. Divisions where house numbers change to next hundred would normally form squares.



● **BUSINESS SECTION** numbers are on 25-ft. unit frontage with 50-ft. lots.

With this system we still need to designate on which side of the intersecting axis a number lies, using N, S, E or W as a part of every address—as 127 W. Oak St. It would be possible to eliminate even this by using four classes of names, such as persons, trees, animals and inaminate objects for the four quadrants. Then each street, when it crosses an axis changes its name to one of another class but beginning with the same letter, as from Blake to Beech or Beaver or Bridge.

The above implies a rectangular street layout. In some cases a city is divisible into two or more districts, each with such a layout but differing in direction of streets from those of the adjacent district. In such case each district can be treated as above and the district designated, as by a letter (127 W. Oak St., Dist. A) or by a name (Oakwood). Where the streets are winding or the layout otherwise irregular, one method is to consider as N-S streets ("Avenues") those diverging less than 45° from north and south; and similarly for E-W streets; a line connecting the ends of a crooked street usually being considered to determine its direction. Or reliance may be placed upon the simple NE, NW, SE, SW designations. Special cases may require study and ingenuity. Irregular street layouts are considered under house numbering.

In the above the axes have been spoken of as N-S and E-W for convenience. In reality they may only approximate these directions, paralleling the principal streets and in fact coinciding with one street in each direction.

Washington, D. C. is a perfect example of a city originally laid out and consistently extended according to a complete system of street layout and naming. The axes and most of the streets run due N-S or E-W. There are a number of wide diagonal streets, which are called "Avenues" and named after the states of the Union. N-S streets are designated by numbers, consecutive each way from the axis—1st St., 2nd St., etc. E-W streets are designated by the letters of the alphabet—A St., B St., . . . W St.; followed by Adams, Bryant, Channing, Douglas, Evarts and others alphabetically arranged in the NE quarter; and by Ashmead, Benton, Calvert, Dexter, etc. in the NW quarter. Intermediate N-S streets are given fractional numbers as names—"½ Street." A number of intermediate E-W streets are given names the initial letters of which are those of the street nearest them toward the axis. Between R St. and S St. we find several short streets called Rigge Place, Randolph Place and Richardson Place.

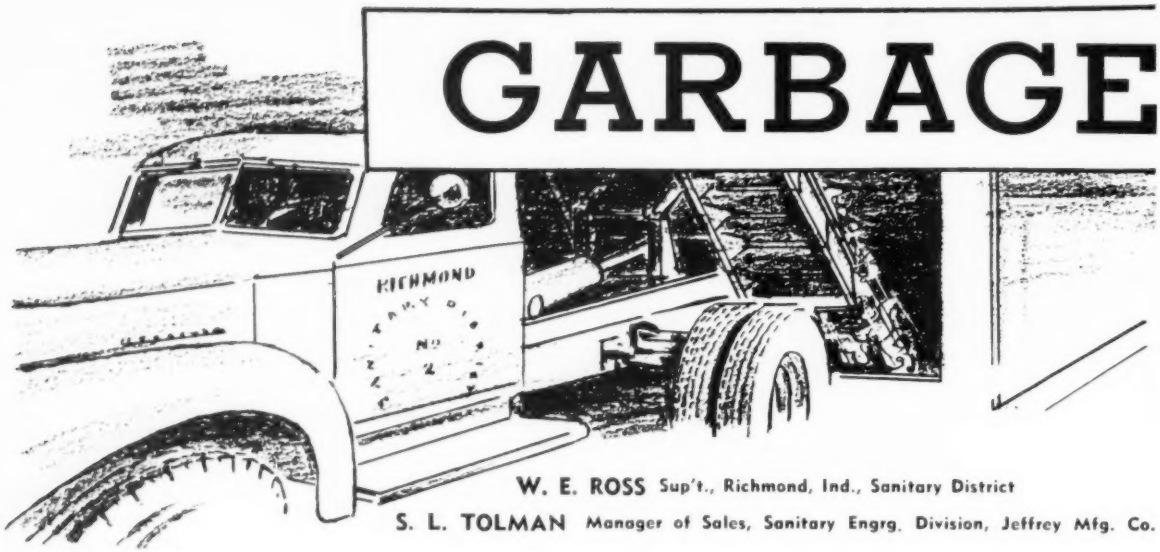
House Numbering

The general practice is to assign even numbers to one side of a street, odd numbers to the other; consecutive numbers being opposite each other. It is desirable also to use a general system throughout the city, as by using even numbers on the south or east sides of all streets. Also to have the numbers in any one street progress in the same direction as in all parallel streets.

The simplest, but least desirable, method of numbering is to begin at the end of a street and assign numbers consecutively to the properties as they are at present divided. If, as is very likely to happen, a piece

(Continued on page 96)

GARBAGE



W. E. ROSS Sup't., Richmond, Ind., Sanitary District
S. L. TOLMAN Manager of Sales, Sanitary Engrg. Division, Jeffrey Mfg. Co.

IN order to eliminate the problem of garbage disposal, Richmond Ind., decided to grind its garbage at the sewage treatment plant and to treat the ground garbage in the digesters along with the sewage sludge. The results have been eminently satisfactory, both financially and esthetically.

Deciding factors in selecting this method of disposal were: (1) The separation of garbage and trash, with separate collection of each, had been a practice of long standing in Richmond; (2) the cost of land around the city was very high, so that a suitable site for a land fill would have been costly if one could have been found; (3) operation of the grinding equipment was not new to the plant personnel since somewhat similar equipment had been used for grinding the sewage screenings; (4) the maintenance cost of the grinder was known to be low; and (5) it was believed that the utilization of the gas derived from the digestion of the garbage would be profitable. In fact, it was estimated that this additional gas would provide power enough to furnish most of the air requirements for the activated sludge plant and also a large part of the power for pumping return sludge.

The original Richmond sewage treatment plant was completed in 1936. This activated sludge type plant was designed for a maximum rated capacity of 7 mgd through the aeration units, 11 mgd through the grit channels and 9.15 mgd in the primary settling tanks. The three digesters provided a total capacity of 146 000 cu. ft. At the rates of flow stated above, the primary tanks had a detention period of 0.9 hr. and an overflow rate of 2960 gallons per sq. ft. per day. The aeration tanks, when handling 7.0 mgd. plus 30 percent return sludge had a detention period of 4.9 hrs. The final clarifiers had a detention time of 1.3 hrs. and an overflow rate of 1190 gsfd.

● **APRON FEEDER and picking table just ahead of the garbage grinder.**

By 1948, the capacity of all units except the grit channels had been so far exceeded that good treatment of the sewage was impossible. Sludge banks were beginning to form in the river at low flow stages. The removal of solids in the primary units had dropped to 19 percent in 1947. By 1949, the flow was about 1 mgd in excess of what the plant could handle and it was necessary to bypass primary tank effluent around the aerators. Flow records were incomplete because metering facilities had been provided only for the flow from the primary units to the aeration tanks, that is, sewage given complete treatment.

The New Plant

To correct these conditions, H. B. Steeg & Associates, consulting engineers, were retained in 1948 to prepare plans for the enlargement of the plant and they were directed to include in their plans provisions for garbage treatment. Their report

GRINDING Pays its Way!

recommended enlargement of the plant to provide a capacity of 12 mgd through the primary and activated sludge units, sufficient digester capacity to permit digestion of the garbage with the sewage sludge and the installation of the equipment necessary for grinding the garbage. The present plant provides 1.3 hours detention, with an overflow rate of 1940 gsfd, in primary tanks equipped with Jeffrey sludge removal apparatus; a detention in the actvated sludge section, with 30 percent return sludge, of 4.5 hrs.; and a detention in the final tanks, also Jeffrey equipped, of 1.8 hrs. with an overflow rate of 890 gsfd. Provision was made for a total digester capacity of 600,000 cu. ft., or 10 cu. ft. per person, based on a potential population of 60,000. The digesters are of pre-stressed construction and heated, through PFT sludge heaters, by cooling water from the gas-driven engines. The digesters have PFT floating covers. The new plant went into operation in the spring of 1951.

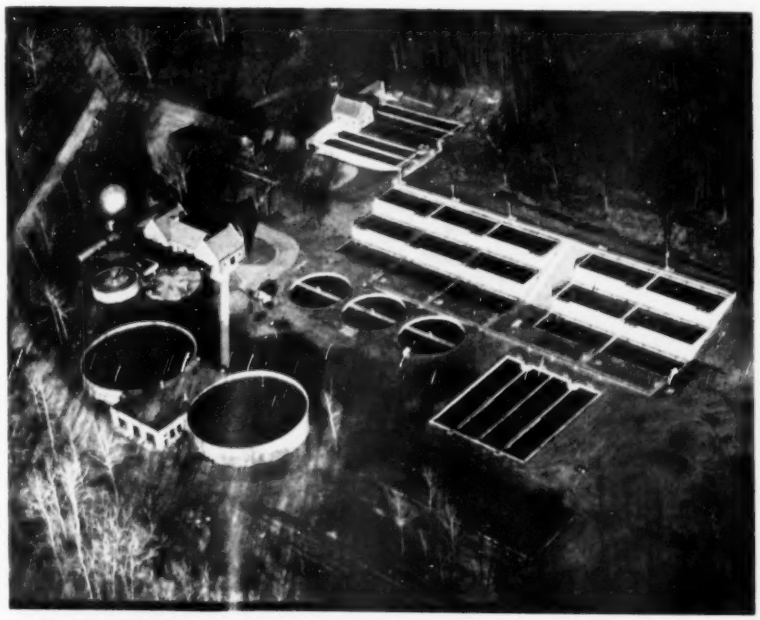
The cost of the plant extensions and improvements was about $870,000. Of this amount, $101,750 was properly chargeable to garbage conditioning and disposal. The cost of providing digester capacity, including piping, sludge heating and other equipment was placed at $71,800. The cost of the garbage handling equipment, including the conveyor, grinder, scales and ventilating fan, was $20,700. The cost of engineering and legal fees was $9,250. On the basis of the design population, the amount properly chargeable to garbage disposal is thus $101,750 divided by 60,000 or $1.70 per person.

A material saving in construction cost was made by using the pre-stressed type of digesters. There are two of these, each 95 ft. in diameter, equipped with PFT floating covers. A PFT sludge heater is provided for each digester; and a sludge circulator which is so arranged that sludge can be drawn from either digester through the heater. Lubricated plug valves were used in the sludge piping to facilitate control of flow.

The flow of sludge from the secondary clarifiers is controlled by telescoping valves and is conducted to a wet well where the return sludge pumps pick it up and return it to the discharge end of the 36-inch Parshall flume. This return sludge is lifted 30 feet. This is necessary because of the unique construction of the aeration units. These are located on a hillside, one above the other. The flow enters at the upper elevation and, as it is discharged into the second level, pulls air in with it. The same thing occurs as the mixed liquor drops from the middle to the lower elevation. The difference in elevation between each set of tanks is 11 feet 6 inches. There are thirty drop pipes through which the mixed liquor passes from the upper to the lower units, and the aspirating action reduces considerably the air that has to be furnished by the blowers. Each aeration tank, three of which make up one unit, is 30 feet wide, 60 feet long and 16.5 feet deep. There are five units, three in the original and two in the new construction, each being equipped with swing diffusers and precision tubes.

Garbage Handling

Garbage is brought to the plant by truck. Each truck is weighed before its load of garbage is emptied into a hopper, from which it is removed by an apron feeder which carries a 24-inch depth of garbage. This is discharged onto a more rapidly moving apron which, in turn, elevates the garbage and provides a uniform feed to a Jeffrey garbage grinder. Just before passing to the grinder, a horizontal portion of the apron conveyor provides a picking table where the operator removes tin cans, bones and other large inorganic articles before garbage passes to the grinder. The ground slurry is discharged to a Jeffrey Jigrit washer which removes egg shells, coffee grounds, metal flakes and bone chips, etc. The slurry is then introduced into the



● AIR VIEW of Richmond's activated sludge plant showing general layout.

digesters by means of two 3-cylinder plunger pumps. These pumps are arranged so that either pump can be used to add garbage to either of two digesters; to transfer sludge from the bottom of the two new digesters; from one to the other or to the second stage digester; or from the bottom of the bank to the top of the same unit. Flexibility of operation with duplication of pumps insures continuous functioning of both digesters even while heaters or pumps are being repaired.

The gas resulting from the digestion of the sewage sludge and the ground garbage is utilized by three gas engines. One is a Worthington 175 hp directly connected to a 4200-cfs Roots blower; one is a Worthington 120 hp directly connected to a 2100-cfs Roots blower. The third is a 43-hp Climax directly connected to a Chicago centrifugal pump for return sludge. In addition, the gas is used to heat boilers in the Office and Laboratory Building and in the Primary Building; and also heats the digester control building and the digesters. As the gas production increases, it is proposed to install a gas engine driven electric generator to carry part of the present electrical load.

At the present time, all of the air for the aeration tanks is furnished by the compressors driven by the gas engines. Over 98% of the power to drive the return sludge pumps is furnished by gas engines. A 32-ft. diameter gas holder, with a maximum working pressure of 55 pounds per square inch, was added to insure more uniform operation of all gas burning equipment.

The original plant had four drying beds, but under the present setup only one 50 x 150 ft. bed remains. The sludge is disposed of in liquid form by means of a 1500-gallon tank truck which carries it to farms for use as fertilizer. The sludge demands to date have exceeded the ability to haul and indications are that this will continue to be the case.

When the garbage grinding program was first started, several minor problems had to be solved. Garbage dumped in the hopper had a tendency to bridge over the feeding conveyor. This was overcome by placing lifting fingers on the conveyor and enlarging the opening from the hopper. The bridging was most troublesome when the garbage consisted mostly of lettuce or corn husks. The installation of a vertical hand-operated screw has eliminated clogging of the exit by bulky material, such as wrapped garbage or watermelon rinds.

Sampling the Garbage

Very few data were available on the amount of volatile solids that could be expected from the garbage, so some means of sampling the garbage was sought. At first it was thought that the easiest method was to get a sample of the garbage after it was ground, but this had to be discarded since no accurate measurement of the amount of slurry added to the digesters could be obtained.

It was finally agreed that the most accurate method would be to sample the garbage in the hopper after it had been weighed. Here again, we were confronted with the problem of securing a representative sample. The method finally adopted and which has given consistent results was to remove a sample core from the material in the hopper. The entire core is then ground in a hand-operated meat grinder. After this grinding, a portion of the ground sample is placed in an evaporating dish and the standard methods for determining the total solids and volatile solids are followed.

Three to four samples are run each week. Garbage is not collected on Saturday or Sunday under normal operations except for a pickup from some of the restaurants on Saturday morning.

At the present time, one operator does all the grinding, all the cleanup of the garbage room and equipment, the greasing of the equipment and some maintenance work. There have been a few times when, due to the nature of the garbage, an additional man has been required to keep the garbage feeding out of the hopper, but this has been so little that it has not been considered. The large bones taken off the picking table and the grit removed by the grit washer are picked up by a rendering company.

As far as the Richmond Sanitary District is concerned, the garbage handling problem has been solved in a very fine way, both from the health standpoint and from the economic standpoint.

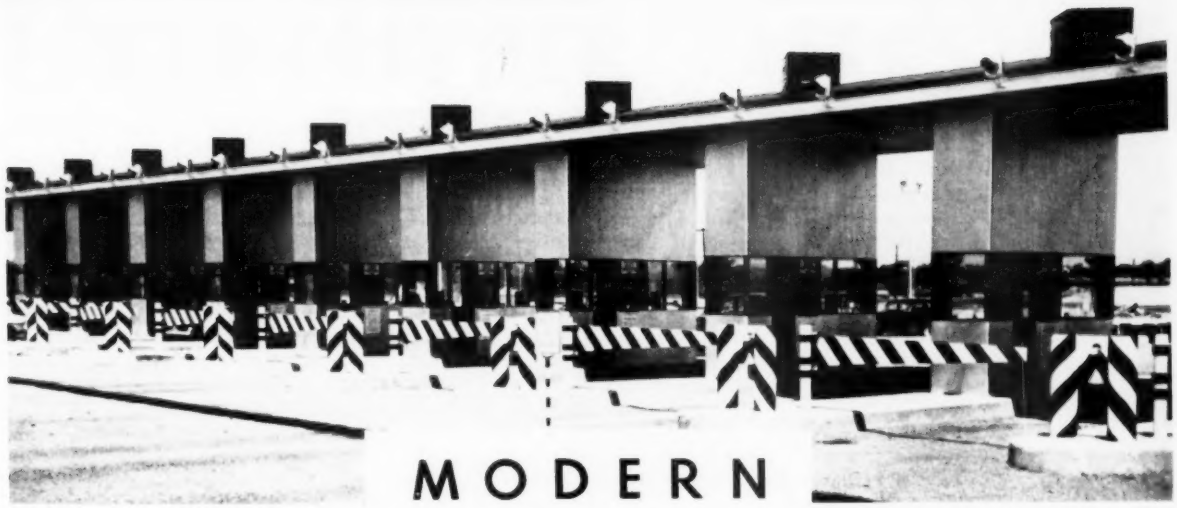
Due to the overloaded condition

(*Continued on page 94*)

TABLE 1—DIGESTER PERFORMANCE

	11-Yr. Av.	1949	1950	1951*	1952
Raw Sludge:					
Percent solids	3.35	2.57	3.34	2.34	3.32
" volatiles	64.0	61.5	56.5	61.6	59.3
Dry solids/1000 lbs./month	252	296	498	404	421
Vol. " " "	158	182	282	249	250
Garbage:					
Green garbage/1000 lbs./month	....	....	....	530	414
Dry solids " " "	....	....	....	124	101
Vol. " " " "	....	....	....	117	96
Percent solids	....	....	....	23.4	24.4
Percent volatiles	....	....	....	94.2	94.7
Combined Sewage & Garbage:					
Dry solids/1000 lbs./month	....	....	....	528	522
Vol. " " " "	....	....	....	366	346
Digester Sludge Removed:					
Percent solids	7.42	5.10	....	....	7.61
Percent volatiles	49.6	52.9	....	....	50.2
Percent volatiles digested	36.1	29.3	17.5	48.5	49.3
Digester Loadings:					
Lbs. solids/cu.ft./month	1.72	2.03	3.42	0.89	0.88
" volatiles " "	1.09	1.25	1.93	0.61	0.58
Gas Produced:					
1000 cu.ft./month	854.9	823.3	761.0	2730.0	2837.2
Cu.ft./lb. volatiles	6.2	4.6	3.0	7.3	8.2
Tons Garbage per mgd sewage	....	....	....	1.5	1.0

*July through December for 1951. The new plant was placed in operation in the Spring of 1951.



MODERN TOLL EQUIPMENT FOR NEW BRIDGE

IT is a long step from the pole across the road to the modern toll-collecting equipment Today, toll equipment must handle our heavy traffic flows smoothly and must be fraud-proof, guaranteeing that all tolls paid are properly recorded for accounting purposes and that the money collected accurately reflects the public's use of the facility.

Best practices in toll installations are illustrated by the facility at the new Atlantic Beach bridge in Nassau County, N. Y. Completed in 1952, the bridge is designed to handle 7,000 vehicles per hour peak flow. The plaza at the north end of the span, where tolls are collected, contains 11 toll lanes. Of these, 7 are reversible and may be used for traffic in either direction.

There are four principal categories of equipment at this installation: (1) For vehicle counting; (2) for toll registration; (3) for visual checking; and (4) for booth operation and control.

The first three are designed to check and double-check the toll receipts collected. Some of this equipment operates automatically and is not subject to any influence on the part of the operator. Other equipment is operated by the collector in classifying the various vehicles to determine proper tolls, but his actions in this respect are completely monitored by visual signals which report his actions.

Counting and Registration

The vehicle counting equipment operates independently of the toll collector in his booth. A treadle is installed in each toll lane adjacent to the toll booth. All axles must pass over this treadle, recording a count at a remote location. The treadles are foot-proof and also record as a separate figure axles traveling in a reverse direction. This is accomplished by two switches which close under axle pressure in proper sequence to record the direction of the movement.

Toll registration equipment is actuated by the collector himself. It consists of what is called a "keybox" and a remote printing register. The keybox contains a key or button for each type of vehicle classification, eight in all, plus two extras for future needs. There is one of these units in each booth, operated by the collector. For every vehicle, he depresses the appropriate classification button, causing a count to accumulate on the remote printing register.

Each toll lane has a remote printing register which records forward vehicle axle count; reverse vehicle axle count, number of transactions under each classification, lane number, time and date and collector's identification. This information is automatically printed on an 18-inch paper tape. This record must balance with the cash, the tickets turned in and the axle count.

Visual Signals

On-the-spot visual checking by both the customer and the toll supervisor is provided Each time a transaction is completed by the collector and the proper keybox button is depressed, two visual records are made: (1) The classification number of the vehicle is illuminated on an overhead indicator mounted on the booth and this remains on until the next transaction is registered; and (2) the cash, ticket or credit is illuminated on a panel visible to the car driver and a bell is sounded.

The overhead signals are used primarily for supervisor spot checking. Since the signal is visible up to 500 ft., a supervisor may watch transactions in all lanes to prevent willful mis-classifications, as registering a two-axle passenger car for a two-axle truck which carried a significant difference in toll rate.

Important in the toll system is the design of the booth itself. Space limitations require a compact design, but the booth must be rugged and comfortable, as well, and must provide good visibility. In addition to proper lighting and heat and even air conditioning, provision must be made for such desk work as preparation of receipts and issuance of ticket books. The booths are of metal, rust-proofed and weather-stripped.

Reversible toll lanes must carry red and green lights to channel traffic properly. The permanent one-way lanes carry a fixed, constant red light facing the exit direction to prevent any entry attempt. Static electricity eliminators are placed in each lane to provide a ground circuit for the car to prevent shock when money is passed.

This complete and modern installation is expected to provide most satisfactory service to the users of this new bridge.

COMPUTING REQUIREMENTS

JOHN E. KIKER, JR.,
Professor of Civil Engineering,
University of Florida

STORAGE facilities on a water supply distribution system are required primarily to provide for fluctuating demands or water usage. In small or medium sized communities, the peak daily consumption may exceed the average daily consumption by 200 percent or more. Normally, the peak daily consumption in a small community is likely to be about 175 percent of the average daily consumption. In a medium or large community it may fall to about 150 percent of the average.

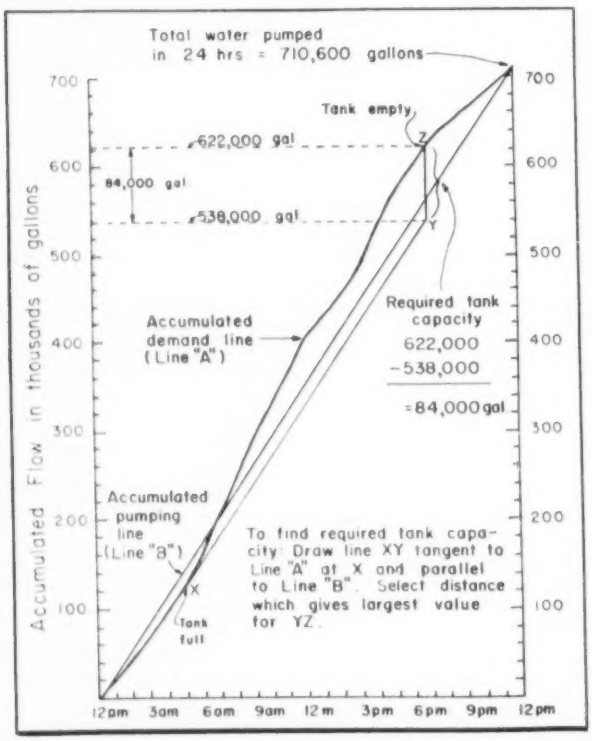
Some engineers have recommended that elevated storage be provided to the extent of 20 percent of the amount of water used on a maximum day. Others suggest elevated storage in amounts varying from about 20 to 40 gallons per capita, depending upon local conditions and averaging about 30 gallons per capita, to permit pumping at a uniform rate.

The amount of storage required, however, should allow for peak hourly fluctuations. In medium communities, this is likely to run upwards of about 250 to 300 percent of the average and in smaller communities without industry it may run appreciably higher. Peak hourly fluctuations have been known to exceed 500 percent of the average. Storage should be adequate to take care of peak periods including late afternoon and early evening hours during hot and dry summer months when there is a heavy demand for lawn sprinkling.

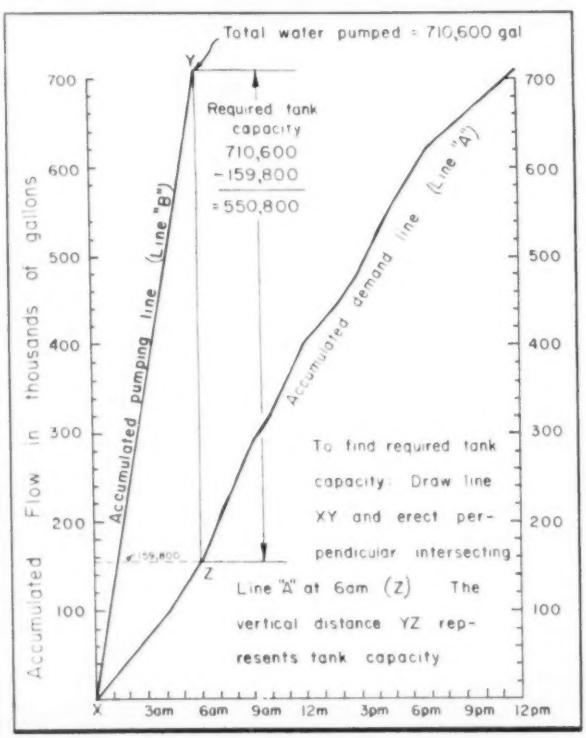
Storage for Fire Demand

In designing a distribution system, allowance must of course be made for fire demands as well as peak domestic demand periods. The amount of storage plus the amount that can be pumped must at least equal the total demand during a fire. In cities over 100,000 the combined fire demand and the average domestic demand is usually less than the peak hourly demand. The peak hourly demand and the fire demand may be about equal in cities of 25,000 population. In smaller communities the fire demand will greatly exceed the domestic peak hourly demand. It is not usually necessary or economical to provide enough elevated storage to satisfy the fire demand in the smaller communities. Ground or low level storage with facilities for pumping into the distribution system may suffice for the fire demand.

Elevated storage is usually advisable to satisfy the needs during peak hourly demands. Such storage lends itself to improved pressures in remote areas of the community. It may permit one-shift or two-shift operation of the pumping station. It contributes also to economy of operation by permitting pumps to operate at off-peak periods when the power rate is low. It is of value in meeting initial fire demands dur-


Total water pumped in 24 hrs = 710,600 gallons
Tank empty
622,000 gal
84,000 gal
538,000 gal
Accumulated demand line (Line "A")
Required tank capacity
622,000
-538,000
=84,000 gal
Accumulated pumping line (Line "B")
To find required tank capacity: Draw line XY tangent to Line "A" at X and parallel to Line "B". Select distance which gives largest value for YZ.
Tank full
Accumulated Flow in thousands of gallons
12pm 3am 6am 9am 12m 3pm 6pm 9pm 12pm

● **MASS DIAGRAM, Fig. 1, shows required capacity of tank with 24-hr. pumping.**


Total water pumped = 710,600 gal
Required tank capacity
710,600
-159,800
=550,800
Accumulated pumping line (Line "B")
Accumulated demand line (Line "A")
To find required tank capacity: Draw line XY and erect perpendicular intersecting Line "A" at 6am (Z) The vertical distance YZ represents tank capacity
Accumulated Flow in thousands of gallons
3am 6am 9am 12m 3pm 6pm 9pm 12pm

● **THIS MASS diagram, Fig. 2, shows required capacity with 6-hr. pumping.**

for ELEVATED WATER STORAGE

ing operation of sprinkler systems.

The size or capacity of the storage tank to be provided will depend primarily upon the function of the tank. A relatively small tank will suffice if pumping is to be performed over a 24-hour period. Large tanks may be required, however, when they are to serve the purpose of reducing the number of operating shifts, or of pumping during periods of low power rates. The principles involved may be illustrated by an example that occurred in actual practice.

The Problem

A large institution was being furnished water from an adjoining city. Normally, the amount of water so obtained was adequate to meet the needs of the institution. The supply available from the city was not adequate, however, during times of drought when a large amount of water was used for sprinkling lawns. Water pressures became low in several areas of the city. They fell to zero in places, including the upper floors of some buildings at the institution.

When such conditions occur, there is usually some likelihood that wastes can be siphoned into drinking water lines from certain of the plumbing fixtures. This potentiality was perhaps more serious than the water shortage itself.

Since detailed records and hourly consumption figures were not available at the institution, it was necessary to make a comprehensive study during the drought to secure the data needed in arriving at a proper solution to the problem. Hourly consumption figures were obtained over a period of several weeks, until the peak daily consumption could be ascertained. Results of hourly meter readings during the maximum day are given in Table I. No storage was available at the institution and the readings represent all water used by the institution.

Example 1—24-hour Pumping

From the data listed, a mass diagram was prepared in the following manner. Construct accumulated demand line "A" as shown in Fig. 1. Join the ends of line "A" by a straight line, marked "B" in the figure. This line represents the accumulated amount of water pumped, totaling 710,600 gallons in 24-hours, and the slope of the line represents the rate of pumping. Draw line xy parallel to line "B" and tangent to line "A" at point x. The largest vertical distance between line "A" and line xy (in this case, the distance yz) represents the required capacity of the elevated tank. In the example shown, it is about 84,000 gallons. (It will be readily apparent from the mass diagram that the storage tank will be filling when the slope of line "B" exceeds that of line "A", and that the tank will be emptying when the slope of "A" exceeds the slope of "B".)

TABLE I — METER READINGS ON MAXIMUM DAY

Time	*Gallons*
12 p.m.	000
1 a.m.	22,500
2 a.m.	46,800
3 a.m.	72,000
4 a.m.	99,000
5 a.m.	128,600
6 a.m.	159,800
7 a.m.	203,000
8 a.m.	248,000
9 a.m.	295,400
10 a.m.	324,200
11 a.m.	360,200
12 m.	403,400
1 p.m.	425,000
2 p.m.	452,000
3 p.m.	484,400
4 p.m.	526,400
5 p.m.	564,200
6 p.m.	594,200
7 p.m.	623,000
8 p.m.	642,800
9 p.m.	659,000
10 p.m.	674,000
11 p.m.	689,000
12 p.m.	710,600

On the basis of the foregoing data, the intention was to recommend a tank or equalizing reservoir of the next larger size; namely, one with a capacity of 100,000 gallons. This was based on the assumption that water would be pumped to the institution at a constant rate throughout the day or over a 24-hour period. It was pointed out by the city, however, that water would be supplied for filling the tank only during the period from midnight to 6 AM. It will be noted from the diagram that the period of least demand at the institution was from about 7 PM to about 5 AM, although the demand within the city itself, which is not shown in Fig. 1, may have been high for several hours later than 7 PM. In other words, the tank might have started filling earlier than midnight but in this particular instance the supplier was unable to furnish water above the immediate needs until after midnight.

Example 2—6-hour Pumping

In accordance with the city's requirements, the tank capacity was recomputed in the following manner: The accumulated demand line "A" was constructed as before. The accumulated pumping line "B" to allow for the delivery of the same amount of water was drawn as before, but only between the hours of midnight and 6 AM as shown in Fig. 2. The vertical distance between the top of xy and the intersection of line "A" with the ordinate at 6 AM represents the required capacity of the reservoir. In this case it is the distance yz and the capacity theoretically required is about 550,000 gallons. Since the conditions were unusually severe, it was concluded that a 500,000 gallon tank should suffice. In this connection, it should be noted that it is not necessary to provide the full amount of storage to secure most of the benefits. In cases where pumpage is conducted throughout a 24-hour period, for example, provision for only 25 percent of the maximum storage requirement will normally lower the peak rate of pumpage by half of the difference between the average and maximum pumping rates.

The foregoing example is typical of a case where it is desired to limit pumping from midnight to 6 AM in order to take advantage of off-peak electrical rates and to permit savings in salaries. To determine the economies attendant upon such an arrangement, it is only necessary to compare the annual savings with

(*Continued on page* 120)

Street and highway improvements often require water department coordination

WATER INDUSTRY PROBLEMS

in Highway Construction

RAYMOND FULLER
Burgess & Niple, Columbus, O.

THE rapidly increasing need for highways to handle greater volume and heavier loadings of traffic results in continuous demand for improvements which will provide for less grade, wider pavement, more stable shoulders, gentle slopes and better drainage. The need for such improvements when soundly conceived is not questioned. Their construction should be supported by all citizens.

However well planned, construction of many newly improved thoroughfares requires that water lines and other utilities be relocated to make way for these improvements. This develops a problem for the management and planners of the water-works industry, and this problem is critical to the industry in Ohio and in many other states because prevailing practice usually dictates that this relocation job shall be accomplished without compensation to the utility.

Management and planners of the waterworks industry have this ever-present problem. It is not a new one. It is one which had plagued the water industry and other utilities for years. Harry B. Shaw, Chief Engineer of the Washington Suburban Sanitary Commission, presented a paper on this subject at the Kansas City AWWA Conference in 1952, and a related paper at the Miami Conference in 1951.

The Kansas City paper stressed the unfairness of requiring the waterworks industry to relocate without compensation its water lines and appurtenances to accommodate highway improvements. This paper cited outstanding examples and indicated present tendency of federal legislation to correct the situation. Shaw also recommended further corrective action and made suggestions for bringing this about. These papers by Mr. Shaw cover the matter thoroughly, and the ideas and suggestions expressed in them can be used to advantage by those interested in relieving the waterworks industry of this financial burden.

The water utility may be faced with problems varying from the raising of one valve box to that of relocating miles of water main because of highway improvements. Almost every resurfacing project on a city or village street requires raising of valve boxes; a widening job may require relocation of hydrants; changing of road grades and alignment may require lowering or moving long sections of water mains and their appurtenances.

Elements of the Problem

The waterworks superintendent is often handicapped in this job by lack of funds; inability to coordinate his meager forces with highway planning and construction agencies; and lack of time and technical skill required to develop a full appreciation of his problem in the minds of highway authorities, which, if done, would tend to result in fuller cooperation by them.

These factors, particularly the lack of funds, many times result in seeking the least expensive way out, and this brings about in some instances a well planned highway from the viewpoint of traffic flow and safety but with a hidden hazard in a poorly located water line. A line under pavement carrying heavy traffic is often improperly protected, and it is impossible to repair without serious damage to the highway and interference to traffic. Further, such situations provide a hazard to both traffic and workmen.

On the other hand, properly planned water line changes, necessitated by highway improvements, may increase the financial problems of waterworks management. A few years ago officials of a community in Ohio worked for several months with highway authorities to develop a plan and finance a major highway improvement providing less grade and wider pavement. The single water transmission line from the source of supply to the distribution system was located in this highway for well over a mile. It was installed when this through highway was a country road. It was under the pavement with little cover at some points. However, when the new highway improvements were constructed, the waterworks department was without money to relocate the line. The result is that the sole source of water supply for this community of 8,000 people was subjected not only to the hazard of breakage from the heavy construction equipment but was left in place still a greater distance from the edge of a new pavement, and in some locations only a few inches from the surface of the pavement, suffering all the load impact caused by present highway traffic.

Another community of 10,000 persons was required to move and relocate about 5,000 feet of 16-inch main properly to accommodate a road improvement. The cost of such an operation today may require over one-half a year's total income from such a waterworks property, and many years of the meager surplus with which many small waterworks departments operate. Still another community was faced with the expenditure of $75,000 for re-

(Continued on page 136)

TWELVE WAYS EQUIPMENT

Reduces Labor and Maintenance Costs

R. H. BALDOCK
Oregon State Highway Engineer

EFFECTIVE use of equipment has made many improvements in the speed and efficiency of our operations, and has materially reduced our labor costs Here are some of the machines that help us do our work:

Front-end Loaders. The use of the front-end loader has resulted in major savings in labor costs. The first pieces of this type of equipment were purchased by the Oregon State Highway Department in 1943. In the nine years that have elapsed, material improvements have been made in the design. We now have 139 loaders of the ½-yd. size, three ¾-yd. loaders, and one 1½-yd. loader. These were first used for loading aggregate used in portable paving plants, and each loader took the place of six wheelbarrow men. They are also used for hand patching, cleaning ditches, removing small slides, loading asphalt barrels, and for many other purposes on highway maintenance work.

Travel Loaders. We have two travel loaders, by means of which the material which has been windrowed from the ditches onto the shoulder is loaded into trucks. Power graders are used to windrow the material from the ditch onto the shoulder. The use of these machines has saved the very expensive hand labor involved in ditch cleaning.

Power Saws and Power Augers. The use of this equipment has resulted in material savings in labor in removing trees blown down on the right of way. We have 60 power saws, including chain saws and Skilsaws, some electric, some pneumatic, and some gasoline-driven. We also have some power augers, which, with the power saws, are a great aid in saving labor in framing and erecting bridge timbers.

Gravel Spreader Boxes. Gravel spreader boxes, developed for use on trucks in the past few years, give a much better control of the spread with less labor.

Sand Spreaders. Sand spreaders for use in sanding icy and snowy pavements in winter and bleeding asphaltic pavements in summer are very necessary equipment. They not only do this work much cheaper than by hand, but it is almost impossible to obtain the requisite labor to do the hand work any more. We now have 11 spreaders on nine-yard body special trucks, and 28 spreaders which can be attached to any truck. The small sanders, which are pulled behind a truck, have been used by the Oregon State Highway Department for many years, and they have not been entirely displaced by the new equipment; but the larger spreaders are quite necessary on mountain summits and other places where much sanding is required. The speed with which a road can be sanded has been materially increased and the amount of labor and hazard to the operators greatly reduced.

Full-width Spray Bar. The use of full-width spray bars on our oilers has increased the speed of the application of bituminous binder and eliminated the center overlap without inconveniencing traffic. This type of equipment has been adopted, in general, by the contractors and by the state force crews within the last few years. It does reduce all costs, including labor.

Chippers. We have two chippers for disposal of brush. These reduce the brush cut along the highway to wood chips, which are blown off to the side, and eliminate considerable labor and hazard to the drivers of vehicles from the smog when the brush is burned.

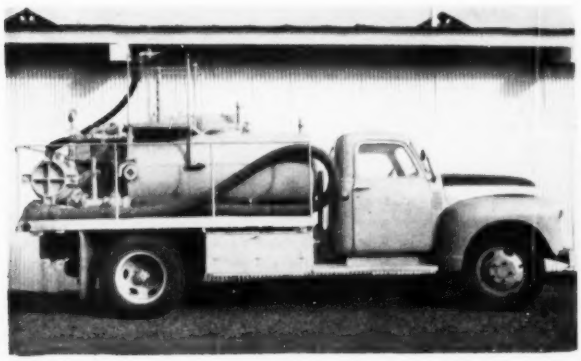
Power Ladder. We have a new power ladder for use on trucks in changing and repairing signal lights and also for trimming trees. This makes the job faster, easier, and safer.

Slurry Pump and Mulching Machine. We have a new slurry pump placed on a truck for the application of seed and fertilizers to highway slopes; and also a mulching machine for shredding straw and blowing it onto the slope to reduce erosion. These two machines eliminate a great amount of hand labor.

Pneumatic Greasing Equipment and Roll and Shape Benders. At the maintenance stations we have pneumatic greasing equipment for lubricating trucks and other equipment and in the repair shops large roll and shape benders which not only reduce labor but make better work possible.

Fork-lift Tractor. We have a fork-lift tractor for moving and storing supplies of plywood and other materials in the sign shop, which greatly reduces hand labor.

Pavement Breakers, Concrete Pavement Saw, and Power Tampers. Use of this equipment greatly reduces labor necessary for making cuts in pavements, to install culverts or power lines for signals.



● **SLURRY pump, mounted on a truck, applies seed and fertilizers to highway slopes with large labor saving.**

● **FRONT END loaders handle aggregate into portable paving plants; each replaces six wheelbarrow men.**

ENVIRONMENT FOR ANAEROBIC DESTRUCTION OF ORGANIC MATERIAL

RICHARD G. COULTER
Assistant Professor of Civil Engineering
The Cooper Union

ANAEROBIC treatment of sewage and wastes has been utilized since about 1881, and separate sludge digestion since 1912. There is, however, very little knowledge available about the organisms required for successful digestion. Even attempts to identify and enumerate the organisms have been few and usually incomplete.

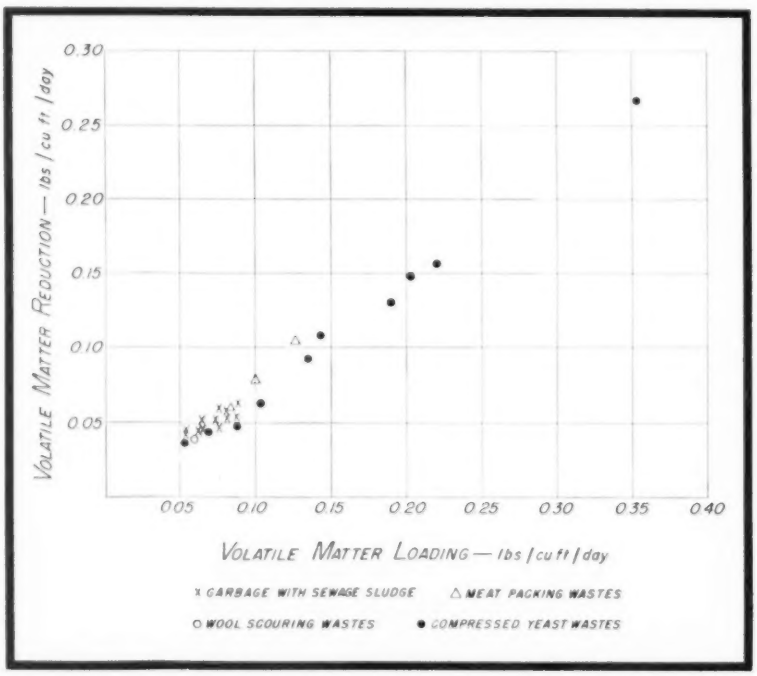
Pure cultures of four bacteria capable of fermenting acetic and butyric acid and ethyl alcohol with the production of methane were isolated about 1936. Basic data on methane-formers can now be collected; and methane fermentations are universally used in the biochemical destruction of organic material. Other fermentations are possible, but methane fermentation is the more natural process and thus most easily established and maintained.

The anaerobic digestion process for the production of methane may be divided into two phases which proceed simultaneously: methane fermentation of volatile acids and alcohol; and hydrolysis of complex organic materials to more elementary compounds and volatile acids. Interference with either will be noted by a reduction in gas production. If the volatile acids are not formed the methane bacteria have no material to ferment. If the methane bacteria are poisoned or inhibited, methane will not be produced and volatile acids may accumulate.

Experience and laboratory work have delineated the environment required for satisfactory anaerobic digestion. Without basic knowledge of all the organisms present, complete control of the digestion process is not possible; but at this time, the conditions required for successful treatment can be defined. Since the methane-producing bacteria are incapable of liquifying or otherwise digesting materials more complex than ammonia, volatile acids, and alcohol, auxiliary organisms capable of hydrolyzing the more complex materials must be present in destroying heterogeneous wastes.

Environment includes all factors external to the cell that affect its living existence and metabolism. This includes submergence in the substrate, temperature, reaction, foodstuffs, chemicals present, and the proximity of other organisms. After the break-in period, an anaerobic treatment device has an active and balanced zoogleal colony bringing about the oxidation of material supplied to it. The members of this colony have become acclimated and adapted to the environment in which they are living, possibly even mutations of some organisms has occurred. Only those organisms that could adapt themselves have survived.

Any sudden changes in the environment will have an adverse effect upon the organisms, and a drop in efficiency or lag period will ensue



● **RELATION** between volatile matter loadings and reduction—Figure 1.

while the colony becomes acclimated to the new conditions. Even if the original conditions are restored, some of the organisms will have been injured or destroyed and a lag period will occur. This biological colony is existing in a substrate, buffered with carbonate and other products of decomposition, and containing active enzymes required for the hydrolysis and fermentation of the material supplied.

The useful anaerobic digestion process is one of adding fresh food material to the developed biological colony in a balanced chemical environment. The media in which the colony exists must be well buffered against changes in reaction by decomposition products from the new material. Enzymes must be present so that simultaneous destruction of the easily utilized simple sugars and the most complex proteins will occur.

Relatively large quantities of carbon dioxide are formed in the fermentation of carbohydrates and fats. Carbon dioxide, being soluble and forming carbonic acid in water solutions, would bring about an acid reaction if ammonia were not present to permit the formation of ammonium carbonate, which increases the alkalinity.

Value of Mixing

For efficient digestion, continuous and thorough mixing of the tank contents is essential. Mixing brings the organisms and foodstuffs into the intimate contact necessary for the full utilization of the biological colony and buffering action of the substrate. Mixing aids in maintaining a uniform temperature throughout the tank and prevents the building-up of isolated pockets of unseeded material or concentrations of decomposition products.

In laboratory studies (1) agitation of digesting sludge resulted in an increase of 26 per cent in gas production and a 30 per cent increase in BOD reduction. The agitation caused the gas to be released more quickly and produced a sludge with improved settling characteristics. Digester capacity has been increased 40 per cent by thorough mixing of the feed and seed sludges.

Scum problems have been alleviated by continuous stirring; although the addition of nutrients (usually ammonia salts) has sometimes been necessary to solve completely the problem. Sewage sludge always contains some grease which is immiscible with water and floats. This and other floating material is an incipient scum layer, although the fats in such a mat are readily digestible if they are brought into contact with the seed material.

Scum may indicate a dangerous condition in that it represents a concentration of organic matter not completely submerged. It may be practically unbuffered and hydrolysis of the material in contact with the surface of the fermenting liquid may lead to concentrations of volatile acids sufficiently high to interfere with other digestive processes.

Rate of Feeding

There is no generally accepted optimum feeding rate. It can be established that the performance of a digester is a function of the applied load. The loading can be represented in terms of volatile matter, BOD, total solids or other factor and it will be found that the number of pounds destroyed each day is proportional to the number of pounds supplied each day. This is true regardless of the source of the material. Figures 1 and 2, plotted using published data of various investigators, clearly indicate this relationship. Sufficient correlation exists to indicate that an active biological colony will act upon the digestible portion of most wastes at about the same rate.

The usual volatile matter loading for sewage sludge digestion tanks is about 5 percent of the volatile matter content of the seed sludge; and this same feeding rate has been obtained for quiescent digestion of penicillin, yeast and chewing gum wastes. Higher feeding rates are possible, loadings of 20 to 25 percent (4 to 5 times normal) have been obtained (1) when thorough mixing of the digesting media is practiced.

Loading per cubic foot of digester capacity is a relative measure of the amount of feed supplied to the size of the colony. Volatile matter content of the feed material related to the volatile matter content of the seed material would probably be an even better relationship since the size of the active biological colony is probably proportional to the amount of food available. However, for design, loading per cubic foot would be most convenient.

For comparisons between digestion of all types of wastes it would seem that volatile matter would be a direct measure of the digestible material and, therefore, a satisfactory measurement to use. Furthermore, since volatile matter can be

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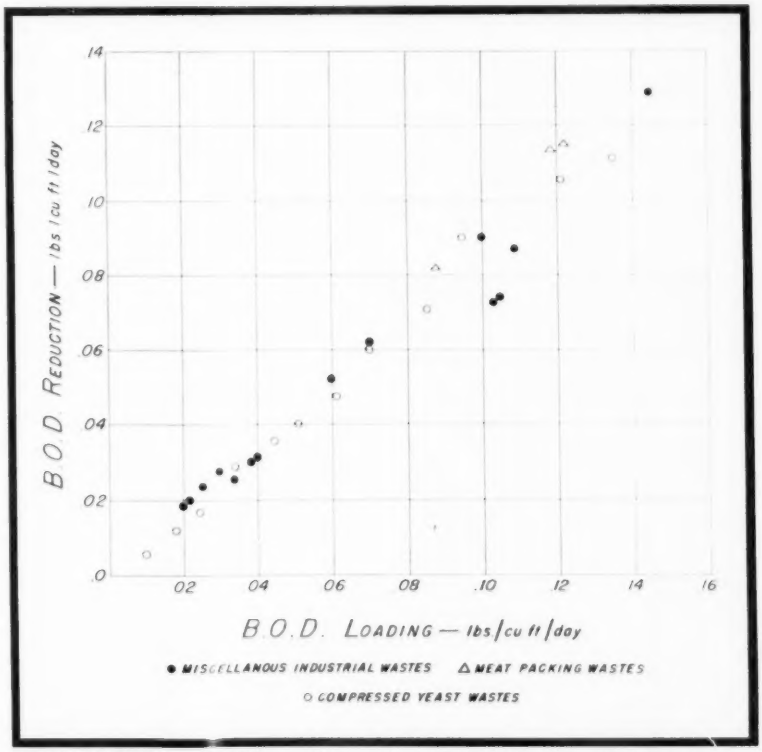


● **RELATION between BOD loading and reduction, Fig. 2. Miscellaneous industrial wastes include strawboard, wool scouring, milk, yeast and other.**

Natural Gas furnishes Cheap Power in Minnesota

ONE of the first of the Fairbanks-Morse opposed piston engines to operate as a dual fuel unit is a 10-cylinder, 1600-hp unit installed in the Wells, Minn., municipal power plant. It has recently completed its first full year of service with natural gas. It was installed as an oil-burning diesel in December, 1950, and was operated on diesel fuel for the first 8 months of 1951. Then it was switched to natural gas with diesel oil as a pilot fuel and it has run more than 6,000 hours as a dual fuel engine.

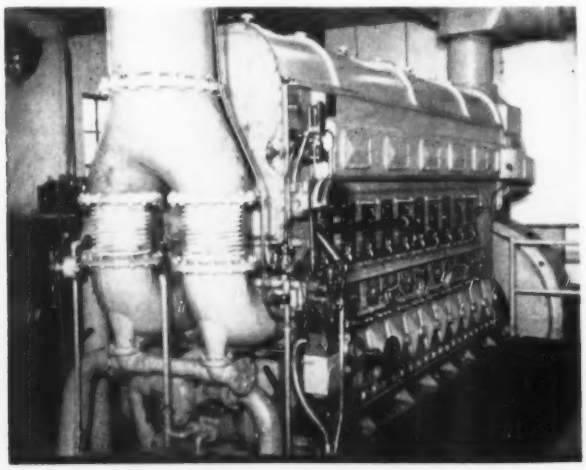
In 8 months as an oil-burning engine, it operated 3,664 hours and produced 2,186,700 kwh while consuming 167,150 gals. of fuel oil, delivering better than 13 kwh per gallon with an average load under 600 kw. Figures are now available for the first 11 months of operation with natural gas. In this period the engine ran a total of 6,308 hours—more than 78 per cent of the elapsed time—and produced 4,861,900 kwh. During the year, it ran about 275 hours on oil, generating 210,400 kwh on 16,180 gals. of fuel. As a dual fuel, it produced 4,651,500 kwh while consuming 62,827,000 cu. ft. of natural gas and 38,790 gals. of pilot oil.

In 1950, the diesel used a crude oil which cost the city 10 cents a gal. and with average consumption at 12.04 kw.hr. per gal., fuel cost per kw.hr. was 8.30 mills. In 8 months of 1951 average cost per kw.hr. was 7.64 mills. For the dual-fuel service during 11 months of 1951 and 1952, using a pilot oil at 11.58 cents a gal. and natural gas at 26 cents per MCF, the average fuel cost per kw.hr. was 4.47 mills. Compared with 1950 costs, this has meant a fuel saving of more than $19,000.

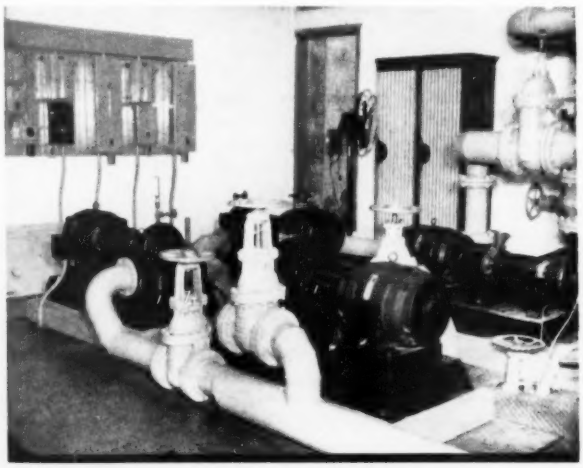
The statement of revenue and operating expenses for the year 1951 showed how this municipal power system maintains its sound financial condition. Energy sales brought an income of $151,288.47. Plant operations cost $65,938.79, distribution $7,163.41, accounting and collections $2,870.59, and administration $2,776.23, for a total operating expense of $78,749.02. This left an operating profit of $72,539.45. Of this sum, the department paid $1,800 in bond interest, wrote off the water department's electric bill, and paid $10,000 to the city in lieu of taxes. All this left a net of $60,311.39.

This community has been providing electricity to its citizens since 1895 when a small steam plant went into service. The city switched from steam to diesel in 1931 with the installation of three F-M diesels, one rated at 300 hp., another at 240 hp. and the third at 120 hp. Four years later, the plant added a 600-hp. diesel. It was another ten years, with a war intervening, before Wells added another F-M diesel, this time an engine rated at 1400 hp. Then, the latest addition came in December 1950 when the 1600-hp. engine was installed.

This municipal power plant is a valued citizen, contributing to the general welfare of the community. First, it performs its primary job of providing dependable service at moderate rates. Second, it contributes $10,000 a year in lieu of taxes, helping to pay the costs of city government. Third, it has built up substantial cash reserves which can be used for plant improvement or civic projects. Fourth, it has financed many public improvements. Since 1949, it has contributed $20,000 for a well and pump, $20,000 for a mercury vapor street lighting system, and $65,000 to the local hospital. Now, aided by dual-fuel economy, the plant can be expected to continue its record.



● **GAS FEED line, shown in front, and 1600-hp FM engine which drives 1136-kw electric generator**



● **FOUR centrifugal pumps handle cooling water—two for raw water and two for jacket water.**

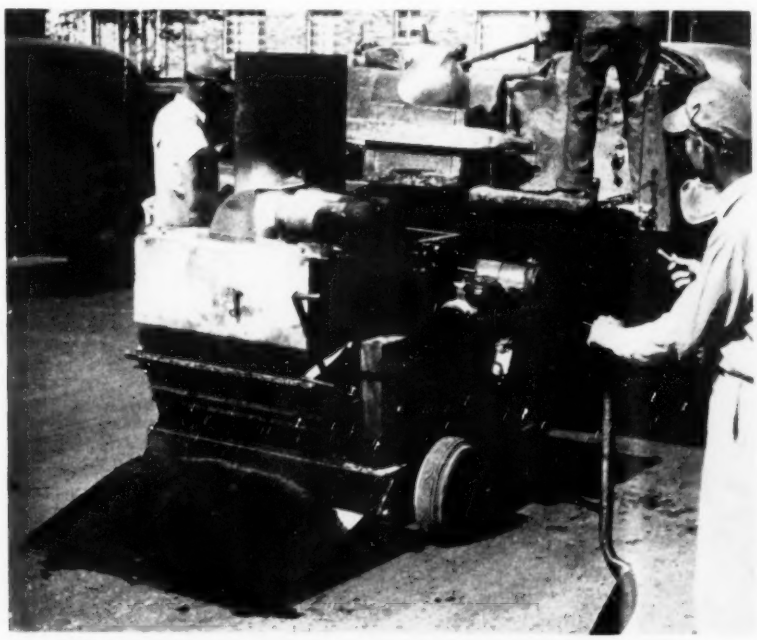
HOW WE DO A BETTER JOB OF STREET PATCHING

WARREN A. COOLIDGE,
Director of Public Works,
Nashville, Tennessee

REPAIRING utility cuts and patching cracks in asphalt streets has always been a most difficult and expensive problem. The City of Nashville is now doing this job in a better way using the following method:

The public utility making the cut must obtain a permit from the office of the City Engineer. A postal card is given with the permit. After the cut has been made, the card is mailed to the City Engineer's office where it is given to a clerk who in turn gives a copy to the Superintendent of Streets. A patch crew places a temporary cold mix patch at this location over the consolidated back-fill material. This patch is allowed to settle for a period of six months or more under traffic. Then a work crew is sent out equipped with a McConnaughay HTD portable hot asphalt patch mixer, one small roller, one air compressor and one or more trucks with necessary material to mix and blend sandstone and asphalt emulsion to obtain the proper mix to match the paving adjacent to the cut. The cold patch is removed and replaced with the permanent hot patch.

● **THIS IS the equipment and organization for normal street patching work.**



● **CLOSE-UP OF mixer, showing how patch material is delivered ready for work.**

For the purpose of obtaining cost data a section of cracked street asphalt built some 12 years ago was selected. This was about 3600 feet long and 46 feet wide with total area of 1872 sq. yds. This street has a waterbound macadam base with a 2-inch sand asphalt surface. This sand asphalt was made by blending 70 percent Alabama rock asphalt, and 30 percent Cumberland River sand with 7½ to 10 percent of asphalt cement as binder. This produced a very hard and dense mix which, during the 12-year period of service, had cracked very badly. The repairs were made by breaking through the surface course using paving breakers and cleaning down to the waterbound macadam base. In some cases part of the base had to be removed. The hot patch was made in two layers. The mix for the first layer was made of small stone, 1½-inch to ⅜-inch, with 5 to 7 percent of emulsion for the binder. Mixing was done at a temperature of 300° F. The top course was made from 50 percent Alabama rock asphalt and 50 percent Cumberland River sand with about 10 percent of emulsion added for the binder. All mixes were held in the mixer until

(*Continued on page* 127)

WHAT ABOUT INCREASED WATER USE AND WATER SHORTAGES?

TO get first-hand answers on many problems of importance to the water works field, PUBLIC WORKS sent questionnaires to all water works in communities of more than about 3,000 population—3628 questionnaires in all. At the time of writing this about the middle of April, 1129 replies had been received. A sampling of the first 300 replies was made; and this was then extended to 600 replies, which is the number represented in this report. The remaining 529 questionnaires have not yet been tabulated, but there is no reason to believe that the data herein will be modified.

Water Use Increase

"How much has your total water use increased in percent during the past two years" was the first question. Here are the answers from 468 cities. Of these 446 reported an increase and 22 a decrease in water use. Based on the 446 reporting an increase, results were:

Less than 5 percent increase, 75 or 16.8 percent of the cities; 5 to 9 percent increase, 35 cities or 7.85 percent; 10 to 14 percent increase, 116 cities or 26.0 percent; 15 to 19 percent increase, 44 cities; 20 to 24 percent increase, 67 cities; 25 to 29 percent increase, 30 cities; 30 to 39 percent increase, 33 cities; 40 to 49 percent increase, 16 cities; 50 to 59 percent increase, 16 cities, and over 60 percent, 14 cities.

The next question was **"What caused this increase?"** Here the answers were clear and direct. In this tabulation, 499 cities are included, of which 73 gave two reasons for the increase. Population growth was cited in 354 cases or 61.9 percent of the total of 572 replies; increased industry was next with 111 or 19.4 percent of the total; air conditioning was given as the cause by 68; dry weather or drought conditions by 43; and miscellaneous reasons by 25. The dry weather and drought conditions include both increased water use due to lawn and garden watering, and low stream flow due to lack of rain.

In answer to the question **"Have you had a water shortage during the past year?"**, 82 cities out of 579 said "Yes" and 493 said "No." Another four said "almost." That is to say that one-seventh of our cities suffered from a lack of available water during the past year.

What of the future? To determine this we asked **"Do you expect a water shortage during the next two years."** To this question, 56 of 552 said they did expect a shortage: 20 were doubtful—"Perhaps." And 476 did not expect a shortage. In answer to the next question **"Why do you expect a shortage?"** there was a variety of reasons. Of 75 cities giving a reason, 20 said "drought or dry weather"; 19 said "population growth"; 9 reported that storage was limited or reservoir capacity

(*Continued on page* 119)

FIG 1—INCREASE IN TOTAL WATER USE

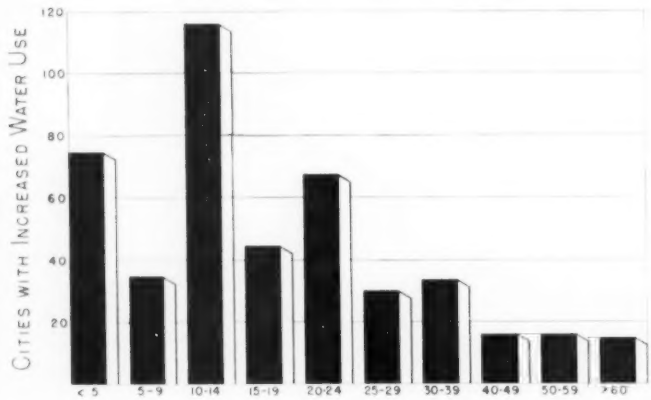
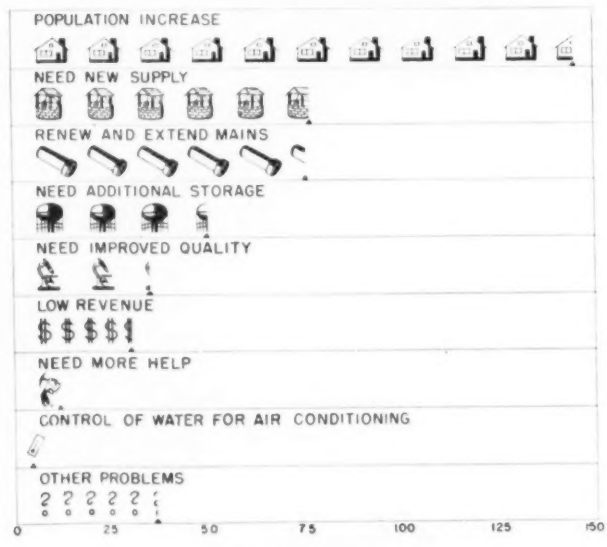


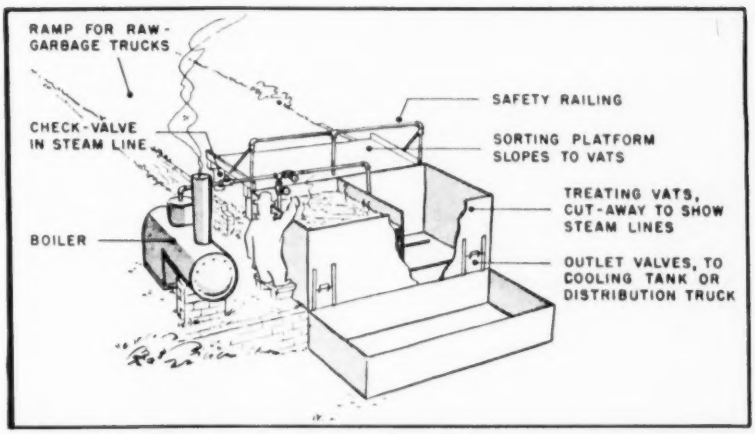
FIG. 2— WATER DEPARTMENT PROBLEMS



EQUIPMENT FOR HEAT-TREATING GARBAGE

HEAT treatment of garbage used for hog food is now required by many states. This is due, in large part, to the recent marked increase in vesicular exanthema, which has been almost wholly confined to farms feeding raw garbage and to marketing centers and livestock terminal points where garbage fed hogs are received. However, another important disease, trichinosis, is also spread through feeding raw garbage to hogs.

Special equipment does not seem to be available for cooking garbage. A report issued last fall by the U. S. Department of Agriculture and the Public Health Service describes some equipment that can be used and gives detail information on procedures and temperatures required. This article is based on that report. The Editor of Public Works would be glad to have descriptions of appropriate equipment designed for, or applicable to, the heat treatment of garbage.


RAMP FOR RAW-GARBAGE TRUCKS
SAFETY RAILING
CHECK-VALVE IN STEAM LINE
SORTING PLATFORM SLOPES TO VATS
TREATING VATS, CUT-AWAY TO SHOW STEAM LINES
BOILER
OUTLET VALVES, TO COOLING TANK OR DISTRIBUTION TRUCK

● **PLANT LAYOUT for heat-treating garbage by steam injection into open vats.**

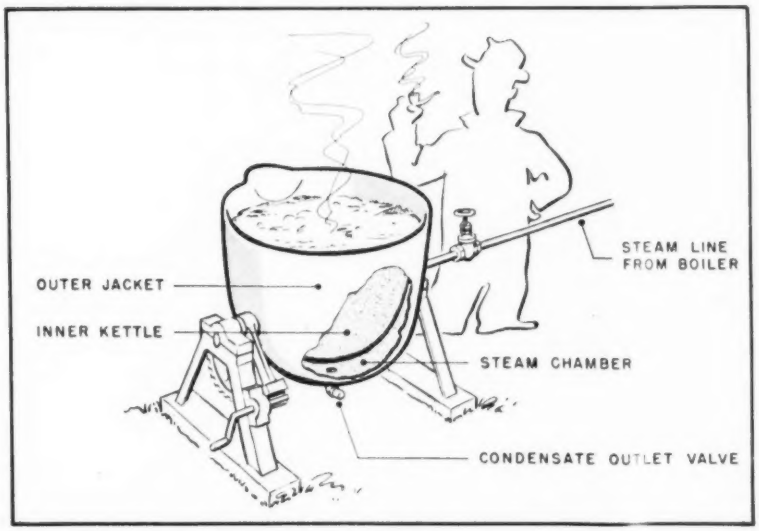
TEMPERATURE. — Procedures approved by State and Federal agricultural officials late last summer required that "all garbage and slaughterhouse and butcher-shop waste intended for use as animal feed be heated throughout the mass at a minimum temperature of 145 degrees F for not less than 30 minutes." However, studies by the National Institute of Health have established that, for practical purposes, disinfection at a temperature of 212°F in a fluid consistency for a 30-minute period is necessary to obtain a temperature of 145°F in pieces of pork up to 3 inches thick. Trichinae are killed by a lower temperature—about 131°F; therefore the controlling factor is the destruction of the virus of vesicular exanthema.

It is therefore recommended "that all garbage, dead animals or parts thereof that are to be used for hog feeding, regardless of any previous processing (unless these materials have been ground), shall be heated to at least 212°F and held at that temperature for at least 30 minutes."

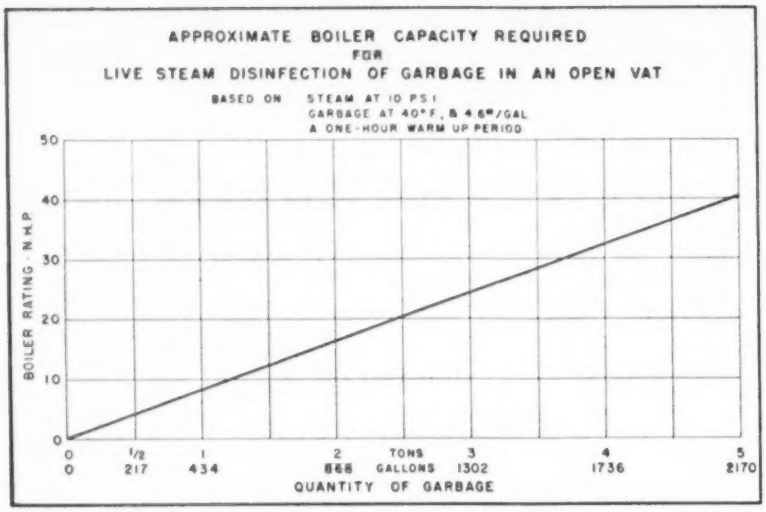
Feeding trials at the California Agricultural Experiment Station have indicated very little difference in the daily gains of swine fed on garbage treated in an open vat by live steam injection and those fed on raw garbage from the same source. Holding the temperature at the 212°F temperature for an appreciably longer time than 30 minutes, or using appreciably higher temperature than 212° may reduce the food values in the garbage.

There is no comment in the reports concerning the odors arising from and during the cooking process, but it may conservatively be assumed that these will be considerable.

PREPARATION FOR FEEDING. —Prior to disinfection, it is considered good practice to hand-sort the garbage to remove as much as is practicable of inedible or injurious materials. Bones should not be allowed to remain in the food, unless ground or softened and disinfected effectively, as it has been found that most processes of heat treatment will not disinfect the bone marrow. After disinfection of the garbage the grease should be skimmed from the top portion of the feed, as it may



● **STEAM jacketed kettle on a tilting frame can also be used for cooking.**



● **THIS IS Graph 1, which shows boiler requirements for open vat cooking.**

make the ration too rich and tend to produce soft pork.

Heating With Steam

Steam is perhaps the most convenient method of heat-treating garbage. Three principal methods are described in the report; Wet-steaming or boiling in an open vat; dry-steaming or boiling in a jacketed kettle or cylinder; and steaming in a pressure cylinder.

WET STEAMING.—In this method, live steam is introduced in the bottom of the open vat containing the garbage to be treated. Steam may be injected through pipes resting on the bottom of the vat, or through pipes welded to the sides and/or bottom. Pipes will usually be ¾-in. to 1½-in. in diameter. When the pipes are small, full-size openings may be left; or 7/32-inch holes may be drilled in the pipes at about 15-in. centers, preferably along both sides and staggered.

Since the steam introduced into the vat will condense, care must be taken not to fill the vat so full that the condensate will cause it to overflow.

Starting cold, about 5½ hours will be required by this method properly to heat-treat a batch of garbage, as follows: To raise steam in the boiler 30 minutes; to raise garbage to 212°F 60 minutes; boiling period 30 minutes; cooling period 210 minutes.

It is possible to place steam coils in the bottom of a tight steel-body collection truck and to treat the garbage in the truck by connecting the coils to a steam line at the end of the collection trip. W. A. Xanten and T. W. Bishton of the Division of Sanitation, District of Columbia, did some experimental work along this line and are said to be planning further experiments.

DRY-STEAMING.—This method requires the use of a steam-jacketed container, the steam being fed into the space between the outer and inner surfaces of the vat or kettle. There is inadequate information on which to base recommendations as to steam and time requirements for garbage disinfection by this method. British reports indicate that sterilization is obtained by holding at a temperature of 350°F for 30 minutes, followed by 2¼ hours at 245°.

PRESSURE-STEAMING. — This method has advantages in that heat treatment is applied more quickly; and, in addition, meat, poultry and fish bones are softened sufficiently to make them edible by hogs. However, they must be ground or fed hot, as they harden on cooling. There is no current information on which to base a recommendation regarding the most economical time-temperature or steam-pressure requirements. Until such data are available, previous recommendations for temperatures should be followed. The pressure steaming method will require equipment that will probably cost considerably more than the other methods.

The Boiler

Graph No. 1 shows the best available data on boiler requirements, based on actual installations using live-steam injection into liquid garbage in an open vat. It indicates the boiler size for various quantities of garbage, using steam at 10 pounds pressure, where the steam is injected directly into the garbage mass and where approximately one hour is required to bring the material to a boiling temperature. It should be remembered that the graph works both ways. If a 4-hp boiler will heat a half ton of garbage in one hour, it will heat one ton in two hours. By applying this principle, the graph can be used for quantities of garbage larger than 5 tons. For instance, to sterilize seven tons in an hour would require twice as large a boiler as 3½ tons would require, that is, about 58 hp.

OPEN HEATING, as by means of a vat over an open fire, is feasible

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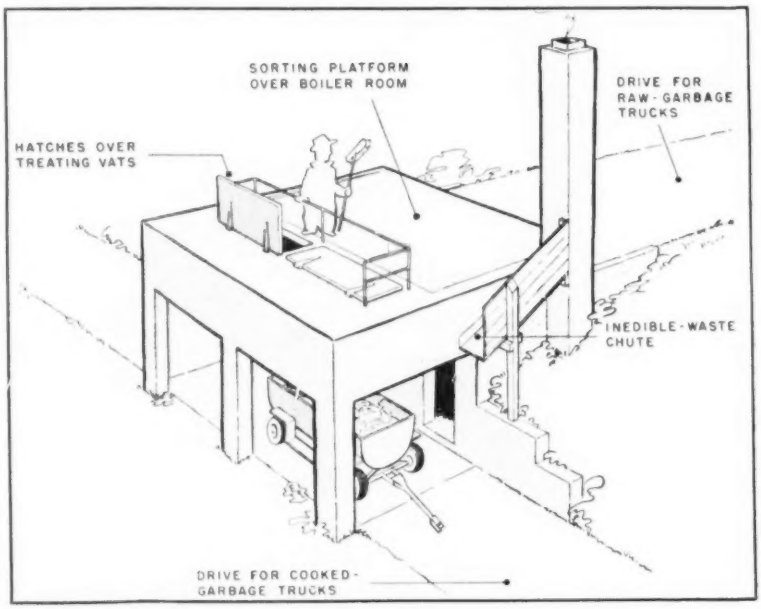

● **HERE IS a two-level layout for steam injection cooking of garbage.**

THE WATER WORKS SUPERINTENDENT:

His Duties and Relations with his Customers and Community

HENRY WILKENS, JR.,
Manager, Texas Water Co.,
Houston, Tex.

THIS paper should really have been given the title "Under Four Feet of Cover," because we water works superintendents are as much out of the eyes and minds of our community as though we had applied to ourselves the specifications we use for laying our water mains, and we have backfilled and tamped ourselves into place there under such a mass of technical details and self-centered activities that no one knows we exist unless it is as those thieves and robbers down at the water works.

So it is high time we looked into this situation to see what is wrong and what we can do about changing it. However, I intend to stay clear of anything that is even remotely connected with the subject of most of those pointless public relations talks that we hear at nearly every gathering of water works men. Those seem to me to be very little more than self-righteous and rather smug illustrations of how we handled this situation or that tough customer, contributing very little if anything at all to the improvement or abatement of the underlying causes that make the customer act as tough as he does, or the situation as awkward as it is.

The term, public relations, as we have thought of it, is so overworked and so misunderstood by us that it is time we gave it a rest and started using a more realistic expression, like getting along, or selling our service, or silent service is not enough.

As I see it, the development of this concept of the term is the most pressing work we have before us. Heretofore, we have gone along without doing very much about it and the result has been that the community has built up an indifference to us and even a lack of confidence in the work our profession is doing in its technical operation of their water systems. We fostered this originally by our own negative attitude toward the community and a complete indifference toward assuming a part in its life.

We have buried ourselves in the development of our operational procedures, rotating in a little circle about our own center, giving little credence to the preposterous assumption of some of the more enlightened members of our profession that there is something else in the universe, that we are only a part of it, and by no means all of it, and we would like to dismiss such distracting thoughts from our minds. Of course, we know there is some place that we have, in our orderly, methodical way, divided into districts and routes and account numbers, but we have reduced its physical presence to neat little rows of name and address plates, filed in cabinets in corners of our offices. But our professional meeting with this outside world is only with long rows of figures on strips of white paper spewing out of our business machines, from which we extract the "per capita" part of our statistics on water use, or revenue, or anything else we might want to gather our amazing, or alarming, or self-satisfied statistics on.

We had better realize, and fast, that this Latin expression, this "Per Capita" that we use so impersonally and so frequently, can be translated into the term "as individuals," and we must learn that our community is composed of these same individuals, that it performs and acts, en masse, as the expression of their thoughts and reactions as individuals. We must teach ourselves that it is whatever happens to them individually that governs their reactions as a group. Therefore, in the same degree to which it affects us it is up to us to do everything within our power to see to it that whatever form our relationship with them might take, it will be of benefit to us. We will also have to face the reality that the need for us to understand what the community means to us is far more important than to get the community to understand how vital we are in making its very existence possible. Happily, though, solving the first reality will lead us automatically to the solution of the second one.

Before we go into any solutions, though, let us examine our profession and see what it really is.

What We Have to Offer

We have nothing more to offer than a service. In our business, we do not have a product made from various other products treated in one way or another to form new shapes or things, nor do we manufacture anything new from raw materials. All we do is to service something that is already there. If water that could be used without harm to life or process were as everpresent as air, there would be no demand for our profession and we would be working at banking or brewing or something. But, water is not always where we need it even though it is a most abundant chemical compound, so men of our profession take it from wherever it is to wherever it is needed, and see to it that it is delivered in a condition and in a quantity that makes it suitable to use for whatever purpose it might be wanted for, at any time it is needed. Although we may change its color or its taste in the process, or take out some less desirable substances that have gotten into it, or even add things to it, we still have water, itself, in its basic, original form. We start with it and we end with it; the only change we make in it is one of degree. We perform a service.

In doing all this we are in a most unique position: we have no competition. There is no one in a business like ours offering the same thing we have to offer, nor is there any one making any claims that his service is better or quicker or more reliable or cheaper than ours. So, we do not have to sell anything in the sense that we have to advertise the merits of our service, nor do we have to send salesmen out to call on our customers. It might be better if we did have to do this because then we would have had to learn long ago that there are customers in a community, that it is most

necessary for us to get along with them and to sell them on the worth of what we have. We would have had to do this or else go out of business, and we would not have let ourselves get into the obscure position we are in because we know that our customers, generally, either have to buy water from us or they do without it.

It is our obligation as superintendents and managers to operate our water systems to the best of our ability, but it is also an important part of this same obligation to bring ourselves out of obscurity, to mix into the community and become active and intelligent members of it, working with the thought in mind that silent service is not enough.

It is well that we give consideration to ways and means of doing this, for we, as professional men, have not done very well along that line in the past. In fact, some attempts have taken rather ridiculous forms at times. Look at those "men at work" signs you see around the excavations we might have to make. They have been the target of so much humor that it is rather faded humor now, and the automatic reaction of anyone seeing them is to ask derisively "Where?"

★ ★ ★

To illustrate another misguided attempt, think of how many times your customers have complained that the meter readers were sitting in the truck or on the curb, putting down meter readings without bothering to look at the meters. Of course, we know he is subtracting the readings for that block to get the individual consumption figures, but not one of our customers can ever be convinced of that. Now, we can tell the meter reader not to do this in the field, or even to leave it to the office to do, but we have not cured the basic reason of why the customers should question the fact that their meters were not being read. In fact, they may have been moved to complain because of the fact that we "increased good will", as we so quaintly put it, by sending the meter reader out in a truck that had the name of the water works painted in big letters on its side panels, and we might have dressed him in a shirt and cap with the emblem or name of our water works. But the effect was exactly the opposite of what we wanted it to be because we only *used* public relations instead of practicing its meaning.

I like to think of this meaning as being our outward expression of an innate sense of fairness and an understanding of how to get along with people and a consideration for them. We are born with this and it can be developed and expanded and made to serve any number of useful purposes, although we cannot acquire it at all. But we have done very little about developing it, though, so why should we blame our customers and therefore the community for having so little confidence in anything we do.

★ ★ ★

For instance, when our customers pay their bills at the water works office, what consideration do we show them? They see a dark, dingy, beat-up looking place with a dusty, cluttered desk, ash tray overflowing, match-sticks and cigarette stubs all around it on the gritty floor; and at the desk to greet them, if that is what you could call his sour look, is some character in shirt sleeves, collar open, maybe reading a newspaper. Rolled up maps, or are they calendars, piled up on top of a battered table against which is leaning a sad-looking, tired old filing cabinet. That is, they see all this if it is not hidden behind some grimy ground glass that glares at them with a little round hole at the level of their eyes, with a slot through which something on the other side snatches money from their fingers anytime they might hesitantly be brought close to it. How can they have any reliance in anything done by the utility representative by this, generally their only view of water works in action, to paraphrase the "men at work" sign. They don't.

Or maybe they ride by the water works itself, and see a dirty, unkempt lot with a pile of old boards, uprooted mains, and jumbled junk over in a corner of it; a rusty looking motor sitting up on top of a pipe sticking out of the ground in another corner; and a shack through whose broken windows and hanging door they see some rusty machinery. How in the world can they have anything but a complete lack of respect for this plant and the manager responsible for it, or of the profession whose standards of performance are so low that they allow such slipshod fulfillment of the duties required of its members.

Of course, the dingy office and run-down plant are exceptions, but even if a water works system is most efficiently managed, whoever heard of the guy running it. Go into any sizeable town and I would be willing to bet that only a small percentage of the people you might ask could tell you who the superintendent of water works is. And you can rest assured that when the time came for this efficient but unknown operator, for that is all he is, to make a plea for funds for salary increases or for new equipment or some expansion, the indifference of the community would have a depressing effect on the outcome of these requests.

But go into a town where the plant is efficiently run, and in addition, the superintendent is an active member of the chamber of commerce, a church, and a luncheon club, and you will be in a town where the value of the water works is appreciated and where the professional standing of the man responsible for its management is highly regarded. Here you will find few defeats of requests for funds for any purpose for the water works. You will also find great confidence expressed by the customers in the service they receive from it, and a strong desire to continue getting it.

The superintendent or manager in this town has placed his position on a level that is equal to that of the manager of the local office of the power company, or the telephone company, or the gas company, which is where it should be. These companies have all made enviable records in getting along with the community they serve and this superintendent is doing the same for his utility.

★ ★ ★

He considers his work as a pleasure. He does not "show up for work," but comes to the office, a shade of meaning that is hard for me to explain, but it is a part of his inborn understanding of how to get along. As managing head of his utility, he dresses as well as the duties he has to perform will permit. Even if he has to tend to many of the field operations because his is a small system, he still maintains a personal neatness in dress and appearance that are in keeping with the particular work he happens to be doing, and there is no doubt as to who the head man on the job is even though he is dressed little differently than the others working with him. I am not a psychologist so I am unable to tell you why this is or how to go about getting this

(*Continued on page* 106)

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APWA news

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NICHOLS AWARD TO BE BASED ON NEW POLICY IN FUTURE

Runner-up Will Not Receive Honorable Mention Award Under New Plan

The Board of Directors of APWA and C. W. Nichols, Chairman of the Board of the Nichols Engineering and Research Corporation, have agreed upon several modifications in the policies and procedures covering the Charles Walter Nichols Award. This annual award consists of an honorarium of $500 and a scroll describing the achievement which is judged to be worthy of the award. The honorary mention award previously given to the runner-up will no longer be made. Under the revised policy, failure to receive the award in any one year does not preclude the re-submission of the candidate for the award at a subsequent date.

Recognize Superior Achievements

The award is made for outstanding achievements in the general field of sanitation including street sanitation, water supply and treatment, refuse collection and disposal and sewers and sewage treatment. The basis of the award is a paper or description of an operation, administration of a function or design of a facility in the field of activity which reveals originality of thought and an aggressiveness of execution by the candidate. The ideas developed or designed must have been put to practical use within the governmental unit in which the candidate is employed. To be eligible for the award the candidate must be an active member of the APWA and engaged in the full-time employment of a municipal government.

How to Sponsor Candidates

Candidates may be sponsored by an APWA Chapter, a State Chairman, or a petition signed by five active members of the Association. The selection of the candidates for the award to be presented at the New Orleans Public Works Congress will be made by the following committee: W. O. Jones, City Manager, Fort Worth, Tex., Chairman of the Committee; Milton Rosen, Commissioner of Finance, St. Paul, Minn.; and William S. Foster, Engineering Editor, American City Magazine, New York, New York.

All nominations with supporting petitions and data should be prepared in triplicate and mailed either to the Association's headquarters office or to W. O. Jones, City Manager, City Hall, Fort Worth, Tex.

Rogers Appoints Cleary Head of Committee To Nominate Officers for the Coming Year

How to Get More Complete Data

Each month special news items are included in this column to acquaint our readers with the activities and nature of services rendered by the APWA. Supplemental information concerning items appearing in this column is presented in the Association's Newsletter. Find out about membership today by writing to the Executive Director, 1313 East 60th Street, Chicago 37, Illinois.

Edward J. Cleary, Executive Director and Chief Engineer of the Ohio River Valley Water Sanitation Commission, Cincinnati, has been appointed chairman of the Nominating Committee by President Allan H. Rogers, Superintendent of Public Works, Garden City, New York. Other members of the Committee include Robert L. Anderson, Superintendent of Public Works, Winnetka, Ill.; Hill R. Healan, City Manager, Meridian, Miss.; F. M. Galloway, Town Engineer, Montclair, N. J.; and Charles A. Reed, City Engineer, Oakland, California.

Six Positions to be Filled

This committee will nominate candidates for each of six positions to be voted upon at the annual election. The election of officers is conducted by letter ballot in accordance with the provisions of the Association's Constitution. Printed ballots will be mailed to members about the first week in September. The results of the balloting will be announced at the Public Works Congress in New Orleans, October 26-29.

• • •

City Engineers Hold Meeting in Indiana

The annual meetings of both the City Engineers Association and the Street Commissioners Association of Indiana were held April 6-9, in conjunction with the Purdue Road School at Lafayette, Indiana.

Clarence V. Windsor, City Engineer of Anderson, was elected President of the City Engineers Associa-

(*Continued on page* 90)

Highlights from New APWA Survey on Swine Feeding Methods of Garbage Disposal

Health and agricultural authorities report that the spread of vesicular exanthema to 37 states during the past several months is attributable almost entirely to the practice of feeding raw garbage to swine. The direct cost of the eradication efforts to state and Federal governments, according to the Bureau of Animal Industry of the U. S. Department of Agriculture, has been about $15,000 a day. The high cost of paying indemnities to owners of diseased and exposed swine, following slaughter, has impelled many states to adopt legislation prohibiting the feeding of raw garbage to swine.

The American Public Works Association and the American Municipal Association have conducted a joint survey to ascertain what action hog-feeding municipalities are taking or will take to change their current practice of garbage disposal. The results of the survey are contained in a special report soon to be published jointly by the AMA and APWA.

170 Municipalities Report

The report is based on data submitted by a group of 170 municipalities of over 5,000 population which are now or until recently have been employing the hog feeding method of garbage disposal. Fifty-three per cent of the municipalities in 1952 paid private hog feeding contractors an average of 63¢ per capita for collecting and disposing of the garbage from their corporate limits. Twenty-seven per cent—mostly in California—report that revenue is either obtained by selling the garbage collected by a municipal crew at an average price in 1952 of about $2.00 per ton or 18¢ per capita, or by charging their contractor for the "privilege" of collecting the garbage for swine feed. The other municipalities reporting either made the collections and disposed of the garbage at a hog farm, or permitted contractors to make collections at no charge in order to "get rid of it."

Garbage Cooking Reported by 23

The only municipal garbage cooking operation that has been reported is the Kansas City, Mo., operation, where only part of the garbage is cooked for disposal at a municipal hog farm which is operated by prison labor. Twenty-two municipalities indicate that their contractors are either cooking garbage at the present time or will probably begin this practice in the near future. Flint, Mich., which operates a municipal hog farm, reports that if pending legislation is adopted to prohibit the feeding of raw garbage then a garbage cooking program will be undertaken.

The survey shows that seventeen municipalities have abandoned the swine feeding method of garbage disposal during the past three years. The majority of municipalities reporting accomplished or anticipated changes indicate that the landfill method of disposal has been or will probably be adopted. Detailed information concerning the heat treatment of garbage to be used for hog feed is also included in this Special Report which will soon be available from either organization—both of which are located at 1313 East 60th St., Chicago 37, Ill.

• • •

FILM OF THE MONTH

Frederick H. Zurmuhlen, Commissioner of the Department of Public Works, New York City, recently announced the availability of a new film, "The Waters Around Us" which relates to the origins of the pollution of the City's waters going back three centuries and to the program adopted and entrusted to the Department of Public Works for its solution. The film was produced by the Movie Unit of WNYC — the Municipal Broadcasting Station of New York City, in cooperation with the Department of Public Works. The 25 minute, 16mm black and white sound movie is available for showing to interested groups without charge. Prints may be obtained by writing to Ernest Neufeld, Department of Public Works, Municipal Building, New York, New York.

This documentary motion picture reveals what the nation's largest city is doing with the problem of water pollution—a problem that also concerns thousands of communities throughout the United States. The film depicts the various stages of developing a total of 18 sewage treatment plants—the last of which is scheduled for completion in 1957—in order to take care of over one billion gallons of used waters.

Report on Best Ways to Reduce Effects of Bomb or Other Attack

Associated Universities, Inc., a non-profit organization sponsored by nine outstanding universities has submitted its report on "Project East River," to the National Security Resources Board, the Federal Civil Defense Administration and the Department of Defense. More than 100 prominent scientists, educators, businessmen and government experts participated in the project which was initiated in June 1951. The purpose of the project was to evaluate and recommend the optimum combination of non-military measures to minimize the effects of attack by atomic, biological, chemical and other weapons on the population and industry of the United States. One part of the report, which has been released for general distribution, is of special interest to public works officials, as it deals with the establishment of measures for reducing the vulnerability to strategic attack of centers of population and industry.

The report states that "the potentially fatal vulnerability of concentrations of industry and people is increasing year by year. . . If the money spent in one post-war year for further construction in these congested centers had been channeled into building in relatively safe locations in their environs, twenty complete suburban towns could have been built providing housing and employment for more than half a million people. . . As it was, the total physical structure of this country's major cities increased about 25 per cent in size during the past decade, a net addition to our urban structure of 2.5 per cent per year."

Some of the recommendations made in the report are: (1) Urban areas should be classified into Class I and Class II Vulnerable Urban Districts; (2) No new defense supporting industry should be located in the established districts or within specified distances thereof; (3) Housing, commercial and non-defense industrial densities should be reduced in the most vulnerable district and should not be increased in Class II Districts. All new construction in such districts should be built to blast and fire-resistant standards; (4) Public and institu-

(Continued on page 90)

CRITICAL WATER PROBLEM

Solved by two HORTON TANKS

Lack of an adequate deep well water supply posed a critical problem in the Chickaming Township Water System serving the Lakeside-Union Pier area in Michigan. The problem was solved, however, by the installation of two 50,000-gal. Horton ellipsoidal-bottom tanks which now provide elevated water storage for the area.

A Chicago Bridge & Iron Company extra . . . a Supervisor was assigned to these structures to make sure that all field welding was done in accordance with plans and specifications drawn by R. W. Petrie & Associates of Benton Harbor, Mich. This service is provided on all CB&I installations at no extra cost and assures you of the *best* welded steel structure your money can buy!

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Boston 10	1038-201 Devonshire St.	Philadelphia 3	1648-1700 Walnut St. Bldg.
Cleveland 14	2221 Midland Bldg.	San Francisco 4	1525-200 Bush St.
Detroit 26	1536 Lafayette Bldg.	Seattle 1	1339 Henry Bldg.
Havana	402 Abreu Bldg.	Tulsa 3	1641 Hunt Bldg.

Now's the time to mail this month's Readers' Service card.

Washington news

Presented in cooperation with the American Public Works Association and through the courtesy of the Washington Office of the American Municipal Association.

A SUBCOMMITTEE on Roads of the House Public Works Committee will make an exhaustive study of the highway financing system of the country. Hearings commenced in Washington on April 14, 1953. Some of the matters to be investigated include: Use of Federal aid money on toll roads; proposals to remove the 2¢ Federal gas tax in States where the State imposes the added 2¢ tax; the role of the Bureau of Public Roads; proposals for levying a ton-mile tax on trucks; and the Federal-Aid Highway Act.

Metals Free From Rationing

Steel, aluminum and copper can now be ordered without use of NPA priority ratings. Effective July 1, defense producers only will have to file for priorities on these materials. Civilian users will be able to buy on the open market from remaining supplies. This does not apply, however, to nickel-bearing stainless steel which is still in heavy military demand.

The new program which replaces the Controlled Materials Plan allows producers of these materials to accept orders from civilian users now for delivery after June 30. Priority ratings for civilian orders already placed for supplies to be delivered after June 30 have been cancelled, but remain for supplies to be delivered before that date, whether or not they are delivered before July 1.

New Public Roads Commissioner

Francis V. duPont of Wilmington, Delaware, has been appointed Commissioner of the Bureau of Public Roads by Secretary of Commerce Sinclair Weeks, with the approval of President Eisenhower. Mr. duPont took office on April 1. He served as a commissioner of the Delaware State Highway Department from 1922 to 1949, including 23 years as Chairman. Mr. duPont was born in Johnstown, Pennsylvania, May 28, 1894. He was graduated in 1917 from the Massachusetts Institute of Technology with a Bachelor's degree in mechanical engineering.

Thomas H. MacDonald, the present Commissioner, is retiring at the end of this month after a distinguished career. He has been in his present post for nearly 34 years.

Toll Road Fever

The toll road fever is sweeping the South's Gulf Coast States.

Symptoms: Alabama's state legislature will get a report in May from an interim committee on toll highway possibilities. Texas' state senate is studying a house-approved measure for a Dallas-Fort Worth pay-as-you-go highway. Florida, Mississippi and Louisiana already have toll projects in various stages of planning and financing.

In Mobile the $4 million Bankhead Tunnel is easing the spread of ideas for toll-backed projects. This tube under the Mobile River earns $750,000 a year on 25-cent tolls, pays the cost of a $7 million city paving program. Its success is one reason why some Alabamans are asking: "Why not a 200-mile toll highway between Mobile and Birmingham?"

In next-door Mississippi, two toll gates will go up on U. S. 90, rimming the Gulf Coast. One gate will be at a Bay St. Louis concrete and steel span, planned to replace the wooden bridge that's bottlenecked tourist and industrial traffic for years. The other will be 50 miles eastward at Pascagoula.

The Louisiana story: Jefferson and St. Tammany Parishes are waiting for design and engineering estimates on a 22-mile Greater New Orleans Expressway over Lake Ponchartrain.

Five other parishes west of New Orleans have awarded engineering contracts for a $90 million, 86-mile toll road between Lutcher and Lafayette, Louisana.

The Dallas-Fort Worth superhighway, if it finally materializes, would be the Lone Star State's first toll road. It's expected to cost about $31 million.

Some Florida items: At Ft. Lauderdale, a $19 million toll tunnel and bridge program has been authorized to ease south Florida beach traffic congestion. A causeway and high span bridge is being built across Tampa Bay as a toll project. Still awaiting authorization is the proposed $255 million Florida turnpike. Its main features: A main Jacksonville-to-Miami road, plus a cross-state leg to Tampa and the Gulf of Mexico.

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City Engineers Meet

(*Continued from page* 87)

tion to succeed Gordon L. Watson, of Huntington. Other officers elected are: Vice-Presidents, Joseph Banta, City Engineer of Shelbyville and Lex Clore, City Engineer of Crawfordsville. Secretary is Ray Andrysiak, City Engineer of South Bend.

Robert Bugher, assistant to the Executive Director of the APWA, was in attendance at this—the 39th Annual Road School—arranged under the direction of Professor Ben H. Petty. Frederick L. Hovde, President of Purdue University and Governor George N. Craig were the guest speakers at the annual banquet.

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Report on Best Ways

(*Continued from page* 88)

tional buildings erected within any metropolitan area (as defined by the United States Census Bureau) which contains a Vulnerable Urban District should be built to blast and fire-resistant standards; (5) Federal grant-in-aid programs should give priority to new highway construction, slum clearance, park and other open space development, and shelter construction; (6) Federal highway aid should be directed more intensively to the provision of circumferential expressways around central metropolitan areas located at least 10 miles from the center of the city; and (7) A Federal program of grants-in-aid for development of park areas in central metropolitan cities should be established. These are just a few of the many recommendations contained in the voluminous report on "Project East River."

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Lighting and Traffic Control

Lighting Pedestrain Crossings

The Road Research Laboratory of Harmondsworth, England, has conducted a series of experiments to find the most suitable lighting installations for uncontrolled pedestrian crossings. Maintenance and economics were not considered in this report but only visibility requirements and how best these can be achieved by different methods of illumination. Among the conclusions drawn are: (1) To avoid confusion, uniform signs should be used to indicate pedestrian crossings. (2) A sign sufficiently distinctive in shape and color might be more satisfactory than the present beacon globe. (3) A flashing light is much more conspicuous than a steady one. (4) Floodlighting helps to reveal pedestrians near curbs and at the same time illuminates the surface marking. (5) Pedestrians at the curbside are more effectively illuminated by light that falls on them from across the road or from the center of the carriageway than from directly overhead. (6) Surface markings and pedestrians are more easily distinguished if the floodlight contrasts in color with the light emitted by the street lamps. (7) Surface markings show up most clearly if the illumination of the road surface is confined to the area of the crossing.

• • •

Giant Snow Plow for Airport Snow Removal

The world's largest snow plow is claimed to be the "Drake Dreadnaught", which is a 30-ton 3-engine machine designed to remove 13,000 cubic feet of snow a minute, and to spray it up to 800 ft. away. At the Grayling National Guard Airport in Michigan, it cleared a fluffy 4-inch snowfall from a 6300-ft. runway in less than seven minutes.

● The Drake Dreadnaught

Two men are required to operate this vacuum cleaner type of machine. Main engine is a 2540-hp aircraft engine which sucks up the snow and blows it to one side; another engine cools the main engine and operates all of its accessories; the third engine runs the truck. Since jet air strips must be cleaned to glass-like smoothness, auxiliary equipment is needed for final clean-up. A smaller version of the "Dreadnaught" is being tried out.

• • •

Zebra Crossings Reduce Accidents in Britain

THE introduction of "zebra crossings" on Britain's roads has helped to reduce pedestrian accidents. This achievement is announced by the Department of Scientific and Industrial Research after a year's experiment in marking roads with zebra stripes for pedestrian crossings.

The idea was developed by Britain's Road Research Laboratory in 1947, in an attempt to find a method of marking crossings so that they could be seen better by car and truck drivers. A year ago the regulation was put into effect—road surfaces at all uncontrolled pedestrian crossings were to be zebra-striped. That is, every designated pedestrian crossing not controlled by a policeman or a lighting device was marked with stripes 20 to 28 ins. wide, alternately black and white, and the crossings outlined on the sides with studs. Later it was found that the stripes were more visible if the black part were of a rougher texture than the white. The total width of the crossing was set at between 8 and 16 feet, and yellow globes mounted on posts or brackets marked the ends of the area.

A pedestrian on a zebra crossing was given the right-of-way over vehicular traffic. This did not mean that a car was required to come to a full-stop—merely that it must not hold up the pedestrian.

The regulation went into effect on October 31st, 1951, attended by considerable publicity. Results were immediate. Even the casual observer could see that more motorists were giving way to pedestrians at uncontrolled crossings. Figures backed up observations. At three crossings where statistics had been made in 1949, the proportion of motorists giving way to pedestrians increased by 60%, 400% and 800%. Motorists were delayed more, and pedestrians less at zebra crossings, and more pedestrians used zebra crossings.

During the first six months of the experiment the average reduction in all pedestrian casualties was 8%, and for fatalities, 14%. Except for the war years, this is the biggest reduction in pedestrian casualties or fatalities for any corresponding six months for which there are figures.

A financial saving to the country has also resulted. A reduction of 8% in pedestrian casualties means a reduction of between 2 and 3% of all casualties from road accidents.

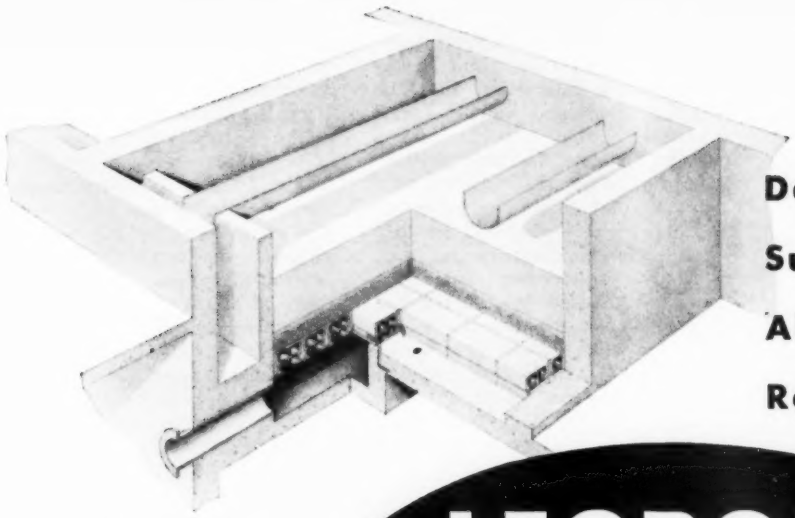
• • •

Priority Rating System for County Roads

A realistic system for establishing priorities for a system of unimproved county roads has been devised by Assistant Executive Engineer George A. Grier of Harford Co., Md. This county was considering the scheduling of improvements for some 320 miles of gravel and slate-base county roads which were of approximately the same structural condition.

To determine which of the road sections should receive first attention the Grier approach takes five factors into account. A residential factor allows 1 point for 5 residences or less along a stretch of roadway, to 5 points for 21 residences or more. One point is allowed for up to 50 vehicles using the road per day to 5 points for 201 vehicles or more. One point is allowed if the road is a connecting link between two hard-surfaced highways, and 1 point is given if the road is a proposed school bus route. If the road is approved for Federal-aid 2 points are allowed; if it may be approved for Federal-aid in the future, 1 point.

The higher the code rating, the more urgent is the need for improvement. For instance, one road had 11 residences on it, giving it 3 points; traffic was 69 vehicles per day, providing 2 points; it was not a connecting link and it had no school bus route, so it received no credit for these factors; but it was a Federal-Aid secondary route, which added 2 points.



Filter Unit Showing installation of Leopold Glazed Tile Filter Bottom

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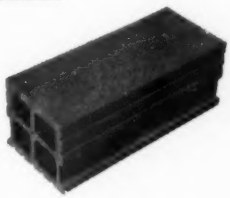
In this design, laterals and distributing blocks are combined in one permanent unit that insures uniform filtration over the entire filter bed and equal distribution of the wash water with minimum loss of head. The individual blocks—each about two square feet in area and weighing approximately 100 pounds—are made of highest quality de-aired fire clay, vitrified and salt glazed. They resist corrosion, are not subject to tuberculation, won't absorb any detrimental amount of water, and are impervious to acids and alkalis.

Adaptable to any rectangular filter unit, the efficient Leopold Filter Bottom needs only a shallow depth of small sized filter gravel to support the filtering medium. Further, the Leopold design does not require special supporting concrete members or the added concrete construction of a false bottom.



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Grinding Garbage

(*Continued from page* 72)

of the secondary facilities from 1947 to 1951, the primary sewage bypassed varied from nothing to 2.0 mgd; and during this time there were decreasing removals of solids and BOD. By 1950, practically no solids or BOD were removed in the primary settling tanks. Removals in 1951 and 1952 averaged 46.4 percent for suspended solids and 29.9 percent for BOD. Flow averaged 6.5 mgd; raw SS were 138; and raw sewage BOD 104.

The activated sludge plant, in 18 months of 1951 and 1952, provided an average detention of 8.6 hours, and used 0.60 cu.ft. of air per gallon of sewage, suspended solids mixed liquor averaged 2270 and the sludge index was 80. Per 1000 cu.ft. of air, 1.05 lbs. of BOD were removed, as compared to 1.62 lbs. for the 13 years average 1938-1950. It should be pointed out that the air used is not a measure of the actual requirements. The blowers are directly connected to the gas engines and, since there is plenty of gas, no attempt is made to reduce air consumption. In the 1938-1950 period, air use was 0.50 cu.ft. per gallon; the SS mixed liquor was 1840; and the sludge index 102.

From the standpoint of solids and BOD removals, since the plant additions were completed, the final settling tanks also showed improved performance, even though the entire flow was handled, bypassing of primary effluent having been discontinued. Final effluent BOD averaged 8 ppm, the same as the average for 1938-50; and SS, at 14 ppm, was lower than previously.

In 1952, the first year when complete records and analyses were available, garbage averaged 207 tons per month. Per capita per day garbage production averaged 0.35 lb., somewhat lower than might be expected. It is interesting that the monthly averages, which varied from a high of 0.42 lb. per person per day in September to 0.26 lb. in February, do not show the seasonal variation that might be expected. The amount of garbage in January was nearly as great as in July, August or September. This may have been caused by greater use of frozen fruits and vegetables and by better packaging of green vegetables so that their use is much more uniform than formerly was the case.

The data on digester performance shown in Table I are very interesting. Through 1945, quite satisfactory operation was obtained as evidenced by gas production, quality of sludge withdrawn and the destruction of volatile solids. From 1945 on, things went from bad to worse until by 1950 only 3.0 cubic feet of gas was produced per pound of volatile solids sent to the digester and only 17.5% of volatile solids were digested. No analyses of supernatant are available, but by 1950 its solids content was probably about the same as that of the sludge. The loading of the digesters in pounds of solids per cubic foot of digester space per month shows wide variations with very heavy loading in 1949 and 1950. The results in 1951 and 1952 show a different picture, with gas production 232 percent over that of the original plant. The gas produced per pound of volatile solids added was approximately as high as the best year shown in the original plant. The amount of volatile solids digested indicates quite complete digestion, with no slowing up in digestion because of the addition of garbage solids to the digesters. The loading of the digesters in the pounds of solids per cubic foot of digester capacity per month is the lowest ever recorded and indicates sufficient digester capacity for many years in advance.

The financial picture of garbage grinding at the plant as shown in **Table 2**, is a pleasing one. The cost of grinder operation includes one man's time for 8 hours a day, although the actual grinding time is about 3 hours, and also includes the cost of electric power to drive the conveyor, grinder and washer. The cost of hauling the sludge to the farms is based upon the assumption that the loads chargeable to garbage is in direct proportion to the percentage of dry garbage solids to total dry solids added to the digesters. Since garbage solids are 95% volatile as against 60% for sewage solids, this method of figuring is on the conservative side. We have taken credit for 8,080,000 cubic feet of garbage gas valued at 65¢ per 1000 cubic feet which is the current rate for gas supplied by the local gas company. Also credit is taken for the revenue collected from the farmers for the liquid sludge. If the gas were wasted, the cost of disposal of garbage by this method would be $1.43 per ton, but by the use of the gas in engines, reducing the cost of power which otherwise would have to be paid for, the Richmond installation shows an actual operating profit of $0.69 per ton of garbage.

Interesting data are available on the sludge. Each load of liquid sludge contains 1500 gallons with a solids content of 7.5 percent. Six loads are applied per acre to the farms. An analysis of this sludge, made by the Agricultural Department of Purdue University, shows that it contains, on a dry basis, 2.5 percent available nitrogen, 1 percent phosphoric acid, a trace of potash, some minerals, and, of course, humus. Based on the nitrogen and phosphoric acid content in the six loads applied per acre, the cost of an equivalent amount of nitrogen and phosphoric acid from commercial fertilizer would be $34 as compared to the $9 from the sludge. In addition, the farmer has the value of the humus. This is estimated at a minimum of $6 per acre.

The results of nearly two years of operating experience, once more shows that ground garbage can be satisfactorily digested at the sewage plant, where plant facilities are adequate for the added garbage load.

Table 2—Operating Cost of Garbage Disposal in 1952

Grinder and Conveyor operation, including labor	$2,620.00	
Pumping garbage slurry to digesters, 4000 kwh @ 1.25¢	50.00	
Supervision	500.00	
Maintenance	250.00	
Hauling 495 loads of liquid sludge to farms @ $1.75	866.00	
Total operating Cost		$4,286.00
8,080,000 cu.ft. garbage gas at $0.65 per 1000	5,250.00	
495 loads of sludge paid for by farmers @ $1.50	743.00	
Total income		$5,993.00

Net profit per ton of garbage: ($5993 — $4286) ÷ 2474 tons = $0.69.

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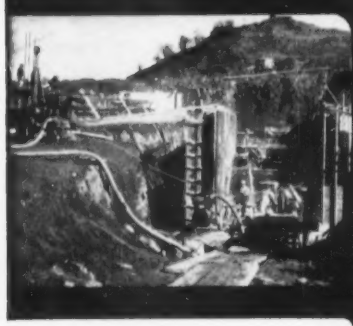

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Furthermore, this experience shows that primary and secondary units function as efficiently as before garbage was handled at the plant. Finally, this method of handling garbage at the sewage treatment plant is attractive financially when the increased gas production can reduce the cost of purchased power. Digester capacity of 10 cubic feet per capita for digestion of garbage, primary and excess activated sludge solids appear to be ample.

• • •

Street Naming

(Continued from page 69)

of property later is divided into two or more properties, or several buildings are erected on it, either sub-numbers must be used (127½ or 127A, 127B, etc.), or the entire street must be re-numbered from this property to the far end; and this be repeated whenever any property on the street is subdivided. This generally is strenuously objected to by the property owners, and the changes may cause confusion in all municipal departments (tax, water, etc.) which have relations with private properties and property owners.

These objectionable features can be, and generally are, avoided by adopting a certain number of feet as a frontage unit, dividing the entire street into theoretical lots with this frontage, and assigning consecutive numbers to these theoretical lots. Each house or lot is assigned the number of the theoretical lot with which it most nearly coincides. The frontage unit should be the least that it is believed will ever result from future divisions of properties. The same minimum unit should be adopted for all streets; for no one can foretell that a given residence street with wide lots will not some day become a business street with narrow ones. The unit most commonly used is 25 ft., but 20 ft. is used in several cities; 10 ft. was used in the business section of New Britain, Conn., and Lowell, Mass.; and 18, 22, 30 and 40 in various cities. Chicago, in adopting a new system in 1908, used 800 numbers to a mile, which would average about 15 ft. of frontage, allowing for street intersections.

The numbering of any given street may begin at one end of the street. However, should this street at any future time be continued in the opposite direction from the origin, the numbering of the entire street must

be revised, or the extension be given a new name or designated by the same name with the prefix N, S, E or W. In some cities, some of the streets may begin at a river, lake or other body of water, and the numbering start there. But rivers, both large and small, sometimes change their channels, and lake fronts may be filled in.

A plan applicable to all streets would be to take some intersecting street as an origin of numbering, the numbering running each way from this base or axis and designated as East and West, or North and South. (Fifth Ave., New York; State St., Chicago; and Main St., Louisville, are such base streets). Or the address of a property may be given the suffix NE, NW, etc., to designate the quadrant of the city in which it is located. (See above, under "Street Naming".) Or the name of the street can change where it crosses the axis.

If the numbering of a street begins at the axis or base street, then any number indicates its distance from such axis. If a street begins at some distance from the axis and the numbering starts at the beginning of the street, this advantage does not exist; moreover, the street may at some future time be extended toward the axis. It is advisable, therefore, to allot the numbers as though the street began at the axis. If this plan is adopted, the number of any building on any street, long or short, tells how far it is from the axis normal to it. By use of one of the systems of street naming described above, the distance from the other axis also is given, and these two coordinates give the exact location of any address.

Another system, known as the block or Philadelphia plan, is to begin a new hundred at each main intersecting street. This is especially convenient where the street names are numbers. Then No. 314 would be in the block between 3rd and 4th St. The distance from the axis then is given in units of blocks rather than of feet.

Where the layout differs widely from a uniform rectangular one, the above system, except for the basic idea of coordinates, must be modified considerably. Perhaps the best system is as follows: Draw rectangular axes on the map in such directions as to parallel most nearly the principal streets; or, if there are no such directions, draw them north

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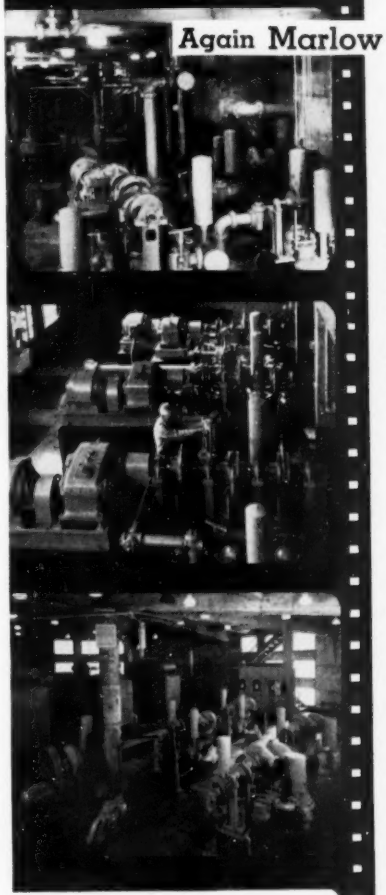

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- **transfer of raw sludge from thickening tanks to holding tanks or digesters.**
- **re-circulation of raw sludge in holding tanks or between holding tanks and receiving and thickening tanks.**

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and south and east and west. (In the following, we will refer as N-S to the axis more nearly approximating that direction.) Then divide the map by lines parallel to the axes into square areas, no dimension of which exceeds 100 times half the frontage unit adopted as a standard. If this unit be 20 ft., the diagonal of the square would be 1,000 ft., and the side of the square 706 ft. Then, the grid lines are numbered consecutively from the axes parallel to them, and the house numbers in any square are in the hundreds designated by the number of the side of this square nearer to the axis to which the street is more nearly parallel. (The direction of a street is taken to be that of a straight line connecting its two ends.) Then the number of a house on the even-number side of any street in a given grid square is obtained by affixing to the grid number of that square the distance on that street from the side of the square divided by one half the frontage unit. Where the street crosses into the next square the house numbers jump to the hundreds of that square. Thus a street parallel to an axis in a square that is second from the other axis would have as its highest house number 170, and the number of the next beyond, across the grid line, would be 202. But if a street line is a diagonal of a square, there is no jump and the numbering is continuous. (Should a street so wind and turn that its length inside of a grid square exceeds 100 times the half frontage unit, special provision must be made for numbering, as by using a longer frontage unit; or using half numbers, as No. 127½, or 127A and 127B.)

In the case of a N-S street, the number gives the distance of a property from the E-W axis but not its location with reference to the N-S axis. To indicate the square in which it lies, the square can be assigned letters, alphabetically from the other axis. Thus 127C Franklin Ave. NE is located on a street running approximately north and south, in the second grid square north of the EW axis and the third east of the N-S axis. Or the squares can be numbered from both axes, the number from one—say the N-S axis—being always given first. (For instance, a residence in Jackson Heights, Queens County, N. Y. is designated as 77-11 35th Ave.)

In some cases this system is modified to adjust it to certain peculiarities of the street layout. (Such a modification was described in PUBLIC WORKS for June, 1951. "Uniform House Numbering and Street Naming System".) Gallatin, Tenn., recently adopted a street naming and house numbering system in which, instead of straight axes running due N-S and E-W, two streets running approximately N-S and E-W were used as base lines. The grid "squares" were not true squares, but the grid lines were, where possible, placed on the center lines of existing streets, so that changes of house numbers from one hundred group to the next hundred group would occur at a street-crossing and not in the center of a block. As this is a city of only about 5,000 population, the indication of the location of a property was confined to the use of "avenue" and "street" designations, the house number indicating its distance from the base line normal to it, and the suffix NE, NW, etc. to show which quarter of the city it is located in.

In the assigning of house numbers, several variations suggest themselves. For example, the number in any block assigned to the corner lot nearest the axis might be that indicated by the frontage unit plan, but the remaining numbers *in that block* should be assigned to the properties as they are at present divided. Should any property in that block be subdivided later, the resulting renumbering would be confined to that block. Again, if the frontage unit adopted is small enough, and a change from a certain hundred to the next hundred would come near, but not at, a cross street, it may be practicable to make a slight adjustment of the unit lengths in that or the adjoining block to bring the change in hundreds at the intersecting street.

Renumbering

Changing existing numbers and street names to conform to any of the systems suggested will present many difficulties. For a large city, a full adoption of such a system would be a major operation—probably impracticable. But for a small city or village it should be practicable, and the sooner it is done, the less will be the difficulty. A city might require that, in the laying out of any section or "development", a given system be adopted.

Some of the ideas, however, could

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be used in almost any case; and each would help. For example, all approximately N-S streets could be designated as "Avenues", otherwise retaining their old names. The use of two prominent streets which intersect at approximate right angles as axes, dividing the city into quadrants designated at NE, NW, etc., will generally be possible.

If renumbering is undertaken, it generally would be best to make a thorough job of it, and use one of the systems described above. However, it might be advisable in some cases to adopt it throughout on paper; then omit changing the existing numbers in the business district, where there might be serious objections to changing the long-established addresses of business firms, and where addresses, however unsystematic, are well known or easily found.

Having changed the numbers, resulting early confusion may be lessened by using both numbers temporarily, the new one followed by the old one in parentheses, as 316 (124) Baker St. After a year or so the old number could be dropped.

Some cities furnish plates or metal figures for house numbers free; others charge their cost at wholesale prices. The former lessens the opposition of house owners to the renumbering project and hastens its general adoption. Many cities, in issuing a building permit, state in the permit the house number assigned to the new building. Notices of the change in number of buildings should be sent to the owners on blanks, stating the date limit for changing the number displayed on the building, the penalty for not displaying the new number; offering to supply the necessary figures for the new numbers, etc.

• • •

Fine-Grading by Maintainer Inside Concrete Forms

On a contract involving laying about 2½ miles of concrete street pavement in Marion, Iowa, the Willman Co., contractors of Cedar Rapids, Ia., have been using a Huber

maintainer to fine-grade inside the forms just prior to laying the concrete. The street being paved required grading, which was done with patrol graders. After the forms were set, the Huber maintainer did the final work. The contractors stated that this unit saved 64 man hours a day as compared to hand work. Street widths were variable, averaging 30 ft. and pavement thickness was 7 ins.

• • •

Sewage Treatment and Water Pollution Research in England

The annual report of the Water Pollution Research Laboratory of the British Department of Scientific & Industrial Research was abstracted in our November issue, page 88. Copies are for sale at 65 cents each at British Information Service, 30 Rockefeller Plaza, New York 20, N. Y.

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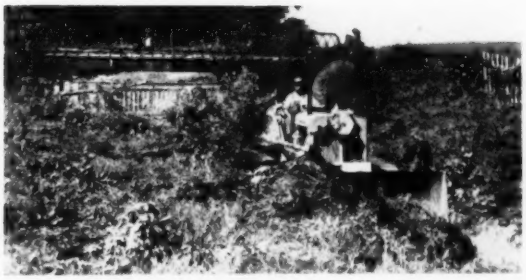
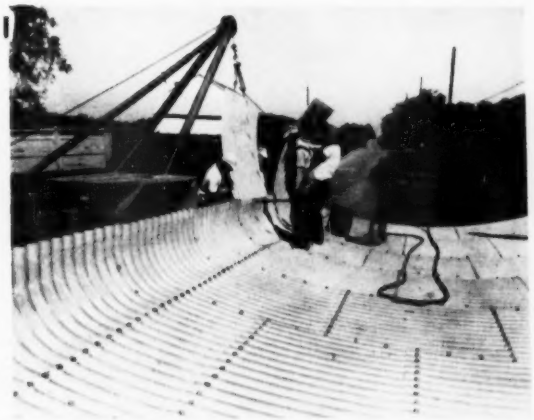


● **FIRST STEP: A bulldozer clears the streambed of debris.**

● **THIRD STEP: The assembled structure is lowered in place. At this point it is partially suspended by cables.**

● **FOURTH STEP: Culvert in place between the abutments, ready for backfilling and finishing touches.**



● **SECOND STEP: The sections of the Armco Multi-Plate pipe-arch are bolted together, ready for placement in the nearby stream.**

● **FINAL: After completion of attractive headwalls, the bridge and approaches are ready for rail and pavement installation.**

Fluoridation Reduces Dental Caries in Grand Rapids

The results obtained in Grand Rapids, Mich., after 6½ years of fluoridation have been reported in Public Health Reports by three dentists, Francis A. Arnold, Jr., H. Trendley Dean and John W. Knutson. Dental examinations were started in Grand Rapids in Sept., 1944, and have been continued. Results that have been obtained up to 1951 are as follows:

1. There has been a reduction in dental caries rates in permanent teeth of Grand Rapids children ranging from 66.6 percent in 6-year-old children to 18.1 percent in the 16-year age group. Similar results have been obtained regarding the deciduous teeth.

2. Similar reductions have not been observed in Muskegon where the water supply remained "fluoride-free" (less than 0.2 ppm F) until the last 3 months of this study period.

3. This change in dental caries rates at Grand Rapids was also reflected in observations based on objective assessment, that is, a reduction in the number of missing teeth.

4. A comparison of the 1951 caries rates in Grand Rapids with those of Aurora, Ill., shows that insofar as can be determined to date the use of a fluoridated water gives the same beneficial effects as does the use of a natural fluoride water of a similar concentration.

Paper Snow Fences

The Michigan Highway Department began testing the use of paper snow fences during the winter of 1949-1950. These consisted of paper strips 12 in. wide stapled to wooden blocks on steel posts. Commissioner Charles W. Ziegler reports that these are cheaper than wooden slat fences and easier to repair and maintain. The paper withstood rain, sleet and wind in good condition, the only damage being due to intentional tearing by children. It is believed that this can be overcome by education and will cease as the novelty wears off. One truck and two men can handle enough paper fence to string many hundred feet. The paper is two-ply, with a layer of fibre and asphalt between. The department plans to use more of these fences.

Less Than One Man Hour Required To Change Hoe to Crane

THE owner of a small crane service in Wisconsin has provided himself with the apparatus and system necessary to convert his all-hydraulic Bucyrus-Erie Hydrocrane to the drag-shovel front-end called Hydrohoe in fifty minutes. This arrangement, the product of a few simple materials, a little labor and a generous portion of ingenuity, equips him to bid successfully on a much wider variety of lifting, digging and trenching jobs.

With the telescoping crane boom and clamshell attachment, this owner's truck mounted machine can handle a variety of widely scattered lifting and digging jobs efficiently. Realizing, however, that on many jobs a dragshovel would be more profitable if the front-ends could be changed without excessive downtime, he purchased the Hydrohoe attachment and set out to cut down on the time required to switch front-ends. Two man hours was considered good time but this small businessman felt he could not afford to spend two hours getting his machine ready for jobs which often were of only a few hours duration—especially when the next job might call for another front-end change.

Here's how he slashed the time in half—with minutes to spare: Using four discarded telephone poles with 2x6 crosspieces, this owner built a platform for the crane boom. It is designed so the boom, resting on the platform, is in a horizontal position exactly where it is when attached to the machine. By following guide forms set on the ground, the truck can be backed into position and the crane boom attached or detached with speed and ease.

The Hydrocrane outriggers permit exact lining up of boom foot connections thereby eliminating the rocking and jiggling of attachments to line up pin holes precisely.

The hoe platform is even more simple. Made of two 2x8 planks, four concrete blocks and guide planks, this arrangement permits the hoe to be set down in precisely the po-

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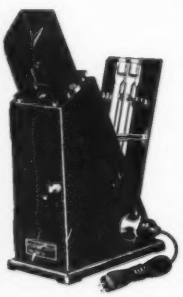

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sition necessary to attach or detach it with ease.

With this apparatus, all that remains is an eight-step procedure which, for efficiency, should be followed exactly on every conversion job: From hoe to crane:

1. Back truck into hoe form watching guide planks to insure accurate spotting.
2. Set outriggers and swing hoe around onto plank and blocks.
3. Detach hoses, cables and hoe stop.
4. Raise outriggers and drive out from under hose.
5. Back truck into crane boom form watching guide planks to insure accurate spotting.
6. Line up main pin on boom and boom rams and set outriggers.
7. Insert boom pin, attach rams, hoses, cables.
8. Swing boom around into travel position, raise outriggers and drive away.

To switch from boom to hoe, alter above procedure to suit.

Though simple to construct and low in cost, this apparatus and conversion system is paying dividends. The obvious advantages of having the right front-end for each job with a minimum of time lost converting means more efficient operation on more jobs.

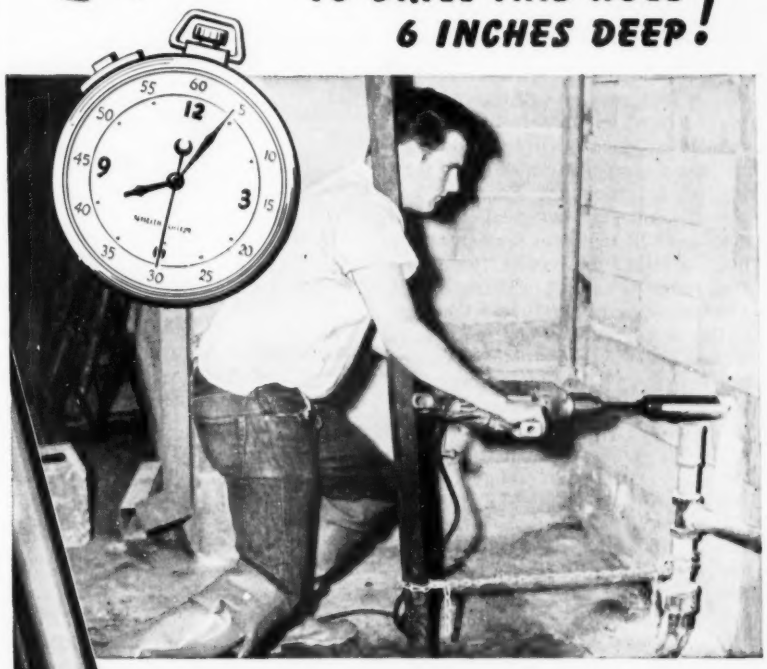
• • •

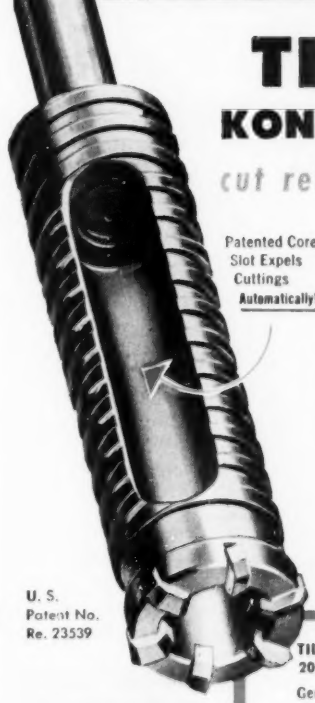
Beware of "Blue Ink" in the Water System

Some water departments are said to operate in "red ink" but when Superintendent Ezra S. Johnson of the Lunenburg, Mass. Water District received a telephone complaint from a consumer that blue ink was flowing from the water faucet you cannot blame him for skepticism. An immediate investigation confirmed that fact so Mr. Johnson collected a sample and drove to the Lawrence Experiment Station. The "blue ink" turned out to be a chemical solution used as a leak sealer.

Subsequent investigation showed that it is common practice for plumbers or steamfitters to add a leak-protector fluid when testing the piping of a radiant heating system. The pressure in the boiler is then built up to test the heating system. Apparently this forced polluted water back into the public water main with the resultant "blue ink" in neighboring houses. The remedy is to see that there is no open connection between the heating system and the public water supply.—(From SANITALK—Mass. Dept. of Public Health).

4½ MINUTES
TO DRILL THIS HOLE 6 INCHES DEEP!





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cut reinforcing rods in concrete!

Patented Core Slot Expels Cuttings Automatically!

Under the actual on-the-job conditions shown above, a Tilden 2½" diameter Rotary Konkrete Kore Drill cut through 6" of concrete—including crossed steel reinforcing rods—*in just 4½ minutes!* The straight, clean, ready-to-use holes permitted immediate running of 2" pipe. You consistently get 5 to 7 times more holes without resharpening with a Tilden Drill—and free factory sharpening is still available on sizes from 3/16" to 4" diameters. Tilden Drills can be used with ordinary electric or rotary air motors. Interchangeable shanks are available for any depth hole.

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Anaerobic Destruction

(*Continued from page 79*)

determined without a waiting period it appears most suitable for control of the process.

Temperature Ranges

Biological organisms have an optimum temperature or range of temperatures at which activity is highest. Deviations above or below this optimum temperature cause a falling off in efficiency. Research has shown that the zoogleal colonies employed in methane fermentations may be either mesophilic (temperature range 32°-42°C) or thermophilic (temperature range 50°-55°C). Activity for methane production is highest in the thermophilic range; however other products have not always been satisfactory and unless the waste is received hot it does not appear to be economical to employ the high temperature range for digestion.

It should be noted that bacteria desire a specific temperature, and not an average temperature. The desired temperature should prevail throughout the tank and should be protected against sudden changes. Pockets of material below the desired temperature can become sources of infection, producing undesired products of decomposition, and disturb the digestion in other parts of the tank.

Reaction

Little methane will be produced when the pH is below 6.2 or above 8.8, the optimum pH for the methane producing bacteria is 6.8-7.2. The pH of digesting sludge is the result of the original composition of the sludge and the products of decomposition. Volatile acids will be present during the formation of methane, but too much acid, affecting the reaction of the substrate, will inhibit the action of the bacteria. It is doubtful that control of pH by the addition of alkali will prove satisfactory in the continued operation of a tank for methane fermentation. It has been shown (3) that the addition of alkali may induce a highly ionized condition of the substrate which will tend to cause the formation of acetate rather than acid from the organic material. Laboratory work has indicated (4) that during the natural anaerobiosis of organic material certain undetermined products which inhibited the methane stage are neutralized or not formed if the reaction of the acid stage is controlled by the addition of lime. This would indicate that the addition of lime may be beneficial during periods of breaking in, or in the operation of Imhoff tanks, even though the desirability of its continued use in tanks for methane production may be doubtful.

Alkalinity

Changes in alkalinity are caused by the accumulation of decomposion products or the utilization of certain materials by the biological colony. The alkalinity (reported as calcium carbonate) of raw sewage varies from 400 to 1200 parts per million, the alkalinity of thoroughly digested sewage sludge is between 3,000 and 3,500 parts per million. Experience has shown that a minimum alkalinity of 2000 parts per million is required in a digester for satisfactory methane production. It has been suggested (5) that the path and control of digestion might be more effectively ascertained if alkalinity tests were substituted for routine pH analysis.

Ammonium carbonates are products of the decomposition of proteinaceous material. Ammonium carbonate and bicarbonate, when formed, remain in solution and contribute to the alkalinity of the substrate. Within the limits of 2,000 to 3,000 parts per million, alkalinity is beneficial to the digestion process; however, laboratory work (6) has shown that the concentration of ammonium carbonate formed during the digestion of seeded feces inhibited the decomposition of the feces. In this regard, it should be noted that excessive accumulations of decomposition products will retard any biochemical process, since the organisms cannot be expected to be active upon their own products of decomposition.

Volatile Acids; Ammonia

Three of the four methane-producing bacteria that have been studied ferment acetic and butyric acids; the fourth ferments ethyl alcohol to acetic acid. Volatile acids are, therefore, necessary if methane is to be produced. The methane organism's tolerance to an acid reaction is not great; too high a concentration of volatile acids may have a deleterious affect upon the digestion process. Methane production will fall off when the volatile acids concentration rises much above 2000 parts per million (as acetic acid); greater concentrations no doubt tax the buffer capacity of the substrate.

Living organisms require nitrogen for the building of their own tissue and in the production of enzymic materials. Many bacteria satisfy their nitrogen requirements from ammonia-nitrogen. Digestion is retarded in ammonia deficient materials. Good digestive efficiency is obtained for carbonaceous material when the ammonia-nitrogen content is 500-600 parts per million (7). For the successful control of scum, in tanks digesting sewage sludge, ammonium sulfate was added although the tanks already contained

New Filter Used for Testing Drinking Water

The Washington Post reports that a new technique for testing drinking water in one-fourth the usual time was tried on the water supply for the "Pullman cities" housing 8,000 inaugural visitors in Washington. It was the first time the new filter method was used on such a large scale.

More than 200 samples were taken and then divided; a part of each sample was checked by the old method and a part by the new, which utilizes a tissue-thin membrane on which the bacteria filtered out are cultivated. The results by both methods were identical, and approval was given the water from all the cars but one (containing water brought from the West Coast). The testing with the new membrane filter method required only 18 hours—the time it takes the colonies to grow so that the bacterial density may be quantitatively estimated. The traditional procedures take 72 hours.

Though water was carried to the temporary hotels in sterilized trucks, it was handled in several stages, at each of which it could have been contaminated. The adoption of the new method in local laboratories is awaiting solution of certain problems involved in the change-over. A complete report on the status and availability of the membrane filter, as a result of an intensive study of its application to water testing, is soon expected from the Public Health Service.—USN Med. News Letter.

over 1400 parts per million of ammonia-nitrogen.

Sulfide.—Investigations on the effect of soluble sulfide (8) on anaerobic digestion found that gas production was halted with concentrations of 140 parts per million of sulfide, and reduced with concentrations as low as 82 parts per million. The sulfide was probably present as HS ions. In the same work, it was found that hydrolysis proceeded with no apparent harm at sulfide concentrations as high as 300 parts per million. The effect of adding sulfide, in a soluble form, to digesting sludge was retardation of gas production and accumulation of volatile acids with ultimate failure of the fermentation.

Control is Necessary

Anaerobic treatment may be used successfully to stabilize the organic material in sewage and wastes. Greatest success will be had when anaerobic fermentation is operated as a process for liquefaction and methane production. This will achieve the greatest destruction of organic material and produce the largest quantity of a valuable by-product.

Control of the environment, in which the biological colony works, is essential to the success of the process. Complete control can not be anticipated until more knowledge of the organisms is obtained and more factual data on the reaction of the colony to its environment are available. Particularly necessary is information on the ammonia-nitrogen requirements of the organisms, their tolerance to various ions and the effect of various products of decomposition.

Volatile matter content is indicated as a parameter for determining loading factors on anaerobic treatment devices. Volatile acids content appears as a method for control of digestion. Assembling data from different sources would be facilitated if investigators included information on volatile matter in their reports.

In municipal sewage treatment, the anaerobic devices are sometimes operated in a manner subordinate to the other devices in the plant. For efficient and satisfactory service they should be operated with the same care as any other biological treatment device.

In any treatment problem full consideration should be given to anaerobic methods of disposal. Economical solutions to many problems may, thereby, be obtained. Sufficient knowledge of the process and its control is available so that anaerobic treatment is feasible for most organic wastes.

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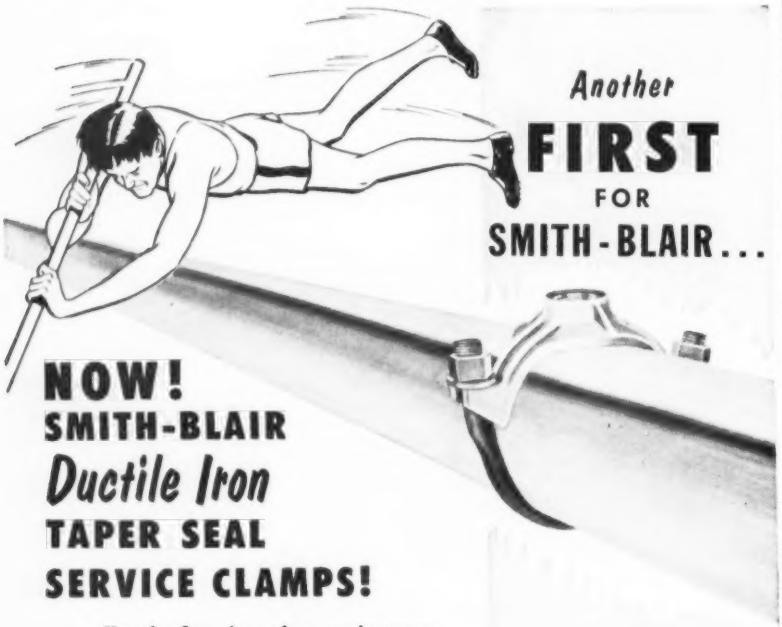

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The Water Superintendent

(*Continued from page* 86)

appearance of successful leadership. But think about it sometime.

Call it putting on a front, if you will, but whatever it is we need it badly in our profession.

Now, some of you might question me here, saying, why, he is a little on the foolish side, isn't he, telling us that shaving every day, combing our hair, wearing clean clothes and keeping our fingernails clean has anything to do with running our water works. What does he think we are going to do when we have to get out and read meters or put in a service or repair that broken main. He ought to sit down before he says too much.

Well, I am not going to sit down and I am going to keep on telling you what I believe is the right way to do things. As I said, I am not able to tell you how you can look like the head man when you are down in a ditch full of dirty water, but it can be done. That is something you will have to work out for yourself. If you don't though, you are going to find yourself down in that ditch more and more often.

Now, the water works superintendent we are discussing does not spend so much of his time on operational duties that he has come to the point where he thinks of them as being the only duties required of his position, and he understands that a failure to accept the existence of anything outside of his own professional existence means a failure to fulfill all the requirements of his position by that much.

Local Participation

He set out, made it a point in fact, to become an active participant in the life of the community and he became associated with as many civic affairs of a non-political or controversial nature as was possible. His participation in these was not in his own name, either. Whenever he had occasion to make himself known, it was as superintendent of water works, or whatever his title was, with his personal identification being of secondary importance, for he knew it was his water works that placed him into a position where he could be of service to the community, so it should be his water works that is given the credit for him being there. He wanted his business, his profession, and himself to be tied together in the minds of his community in that order. This

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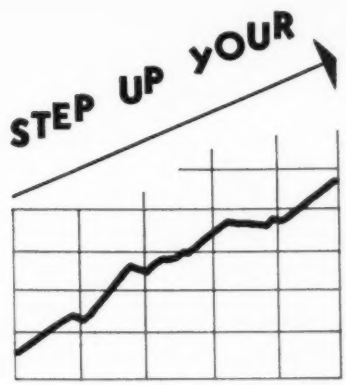


filter performance with PALMER FILTER BED AGITATORS

The Palmer Filter Bed Agitator is a simple and inexpensive device that is being incorporated in new and existing plants to increase the filtration capacity and eliminate mud balls.

TECHNICAL ADVANTAGES

- 1—Requires an average of 40% less wash water
- 2—Completely eliminates mud balls
- 3—Eliminates cracking or shrinking of the beds
- 4—Produces "new" filter media after short period of normal operation
- 5—Turns out purer, better tasting water
- 6—Low installation cost
- 7—Low operating cost
- 8—More water through the filters
- 9—Less "time out" washing filters

The Palmer Filter Bed Agitator is covered by U. S. Patents 2309166 and 2309917.

ENGINEERING FACTS

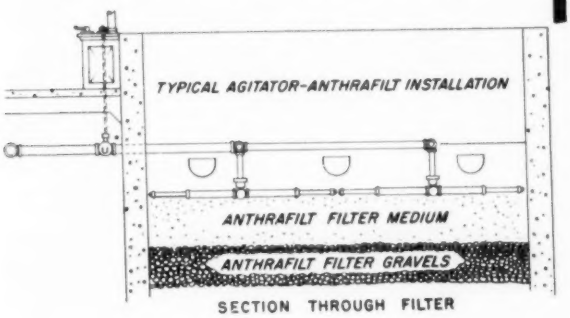
CONSTRUCTION—The Palmer Filter Bed Agitator is constructed of brass and bronze throughout. Nozzles can be removed easily from the agitator arm.

SIZES—Palmer Agitators are adaptable to any size or type of filter. Available in lengths up to 15'.

WATER REQUIRED—The Palmer Agitator operates with low volume at high velocity. Usually, a delivery of ½ g.p.m. per square foot of filter bed is ample.

PRESSURE REQUIRED—40 lbs. and upwards. R.P.M.—The speed of the Agitator varies from seven to eighteen r.p.m.

SIMPLICITY—Simple to install, easily observed and inspected.



SECTION THROUGH FILTER

The Palmer Agitator consists of a horizontal bronze arm suspended just above the surface of the Anthrafilt or sand. The agitator arm contains jet nozzles through which water is forced at extremely high velocity. The jets are pointed downward to penetrate the filter media before the wash water is turned on. This penetration breaks up the surface of the filter bed while the agitator revolves slowly, propelled by the velocity of the water through the jets. Thus, the media is in a fluid condition and free from encrusted deposits when the wash water is turned on. When the wash water reaches the level of the agitator arm, the tremendous velocity of the jets causes violent turbulance while the upper strata of the sand or Anthrafilt is expanded. The Palmer Agitator remains in action until shortly before stopping the filter wash.

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is a small matter but it is most important in selling our service.

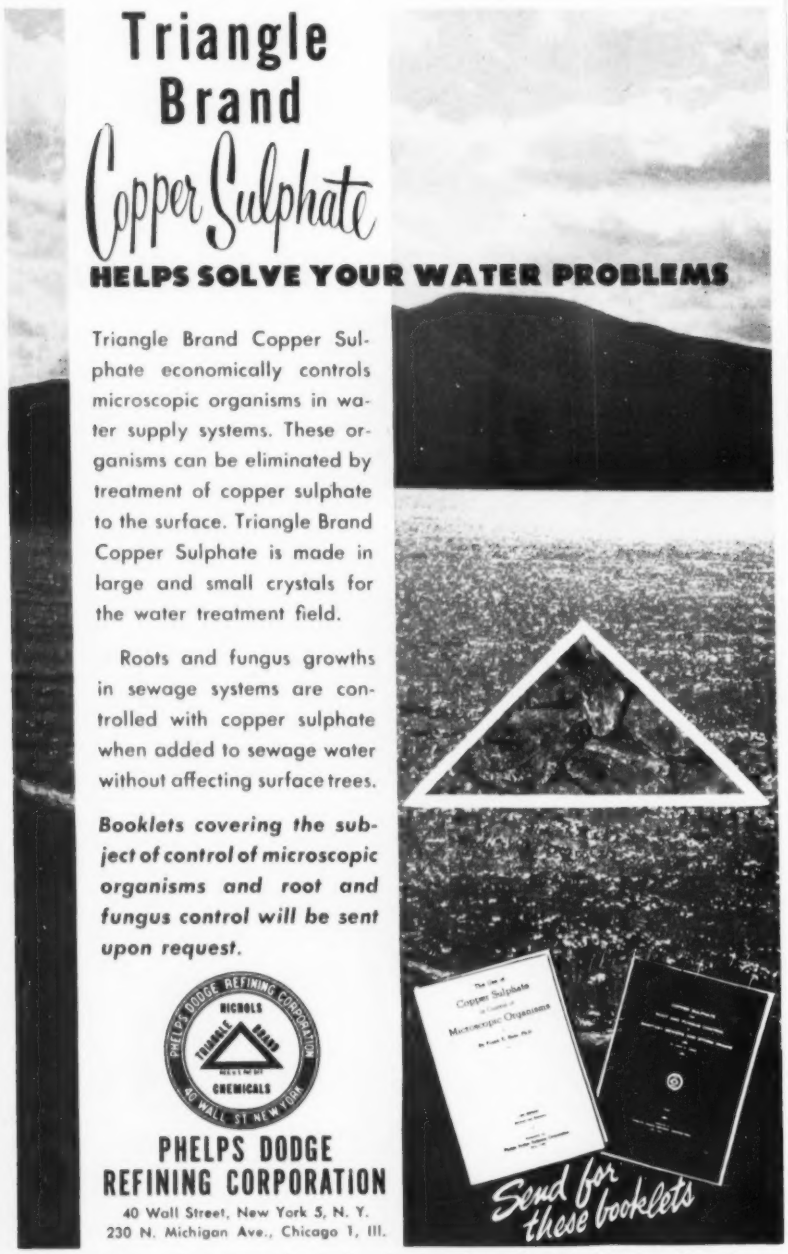
One of the first things he did was to join the chamber of commerce. These organizations can exert a powerful influence over the destiny of a utility when they come out for or against needed improvements, and he realized his membership and active interest here could be of the greatest importance to his water works. As a part of his work with it he served on its insurance committee, where he could call attention to defects in his plant, that, if corrected, for instance, by the expenditure of some bond money, would reduce or lead to a lowering of fire insurance rates. He also found time to serve as a member of its water committee. There he could point out that with some money spent for this or for that specific purpose, the adequacy of the town's water supply would be assured, allowing its growth to proceed unhampered by an ill-timed, suddenly discovered lack of water reserves. He does this missionary work, or selling job, in an organization whose sole purpose is to improve the town, as a member of the community personally interested in its upbuilding, and, through the utility he represents, as an integral part of his community. He finds it much easier to do it this way, too, than to sit in his office waiting for someone to invite him to a meeting to explain his requirements and defend his stand on them, or even finding out that they have been rejected without anyone thinking to ask him about them. He has discovered that a defense is generally not much use in going after something.

Another of his activities is as a member of one of the luncheon clubs. Of course he chose the best one for which he was eligible. Here, in extremely favorable circumstances he can meet on informal ground and on a friendly basis, many of the town's leading business men with whom he will make contacts and become known under conditions that are virtually impossible to find in any other way.

He also knew that there was nothing that could contribute so much to the dignity with which he should surround himself and his profession, as a genuine, real interest in the church of his choice. He knew that if it ever came to a point of decision by the community as to the merits of two men, or their ideas, with everything else equal, the man who identified himself with his church and was not afraid to stand up to its requirements would be the one chosen, whether for a position or an opinion. He realized that we, in our profession, seem to have a great need to achieve the personal dignity possible to attain only through our acceptance of the principles of living as they are set forth in the teachings of our religious faith, and that the executive who does accept them and puts them into use has added much to his stature thereby and to that of the profession he represents.

Another important step he took was to seek the friendship of the editor of the town's newspaper. He realized that this man has as much influence on the course of his work as any one person can have, and that he is often in a position where he could make or break him. He knew his friendship should be on a genuine basis, of course, but if for some personal reason this was not possible, then he would try to build up a mutual respect, all the while trying to bring real friendship closer. He did all he could to cooperate with him, giving his reporters as many stories as they wanted about his business and profession, of which he found there was a practically unlimited supply.

Our superintendent knew, also,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that if the editor ever got hold of a story that could hurt him or his business he could go to him immediately and without hesitation and talk frankly to him off the record. If the editor could conscientiously do it he knew that the hurting part of the story would be minimized or left out. If our superintendent was unsuccessful in having either one of these done, at least he improved his position by finding out where he stood, and he would know how to proceed from there. He understood this, though, that no newspaper editor will hurt a man very much who is well-thought of by his fellow citizens, who has conducted himself with propriety and dignity in his dealings with the community, and who is professionally competent.

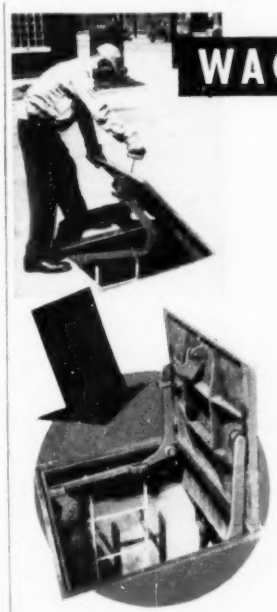
This brings us up to a point where we are going to have to stop and take a look. In all that we have been talking about it was assumed that we were professionally competent superintendents and managers. But occasionally, we find this is not altogether true. All of us know of men who have been placed in position as heads of water works, whose only qualifications were that they were brothers-in-law, or that they were friends of some politician, or because they were last minute choices of desperation because no one who was professionally qualified, who knew about the position and the unsanitary package, tied with political strings, that it was, could be persuaded to take it.

Unfortunately, these situations do exist today, which means that we, as a profession, are going to have to do something about policing our own ranks. We will have to raise our requirements for admission into it, both from moral as well as education-experience standpoints. Then, we will have to make certain that no one can remain as a recognized member of it unless he continues to meet them and adheres to a code of ethical practice that should be set up as the first step we make in this direction. All of this is going to take a long time and it will need a lot of help from a lot of people. It is also a program that will have to be coordinated by several organizations, and they will all need your voices and your active participation to reach this end.

All of this community service work, this selling our service, this getting along with our customers and our community, this talk about raising our professional standards, may sound like completely irrelevant and trivial matters in the management of water works, and I grant you it is quite foreign to the way we have been doing things in the past. I have to emphasize the necessity, though, of our understanding that they are as integral a part of our duties as is pushing the starting button on the well pump motor so we can get some water to deliver to our customers, but I believe we have failed to realize their close relationship to our work and to our existence as a profession.

I will end this by stating that if you have to spend so much of your time with operational duties that you are unable to find time for these equally important professional and community liaison duties, then you are either not a very good superintendent or manager and in much too high a position for your abilities, or you are neglecting half of your job. We have done part of our work well, the technical part, and it is not too late to start doing as well with the other one.

Mr. Wilkens presented this as a paper before the 1953 Texas Water and Sewage Works Short School.



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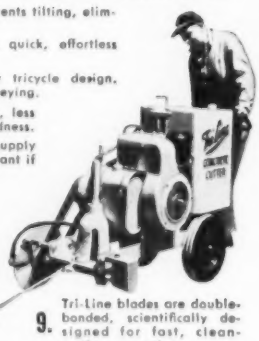

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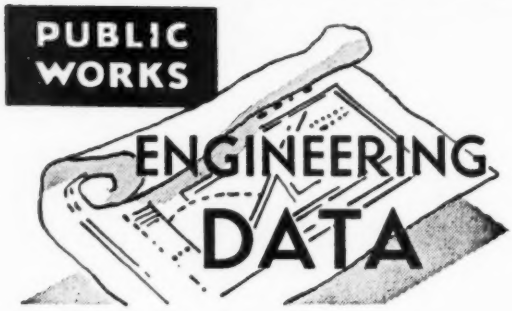

"Trusties" Salvage Material at Refuse Dump

Contracts for salvaging waste materials at the ten refuse dumps in Denver, Colo., were terminated some time ago. Now 100 prisoners from the county jail are used for salvage work. Guarding is done by deputy sheriffs. Benefits reported are less crowding of the jail during the day, space conservation at the dumps and an income estimated at $100,000 a year.

Sewage Treatment Project for Independence

Shown in this aerial view is the new treatment plant at Independence, Mo., taken at an early stage in construction. The two clarifiers, the trickling filter and the digester and control building (at the right)

are identifiable. The overall cost is about $1,000,000. Charles A. Haskins of Kansas City is the consulting engineer; the contractor is Lippert Bros., Inc., Oklahoma City, Okla. The photo was sent to us by A. M. Byers Co., which furnished the wrought iron pipe used for all gas lines, small water services, sludge sampling lines and filter distributor arms.

Sludge Gas Production and Use at Gary

According to the latest annual report of the Gary, Ind., Sanitary District, of which W. W. Mathews is superintendent, the plant produced an average of 154,475 cu. ft. of sludge gas per day. This equalled 1.27 cu. ft. per capita per day; 6500 cu. ft. per million gallons of sewage; 2.3 cu. ft. per pound of solids added to the digesters; and 5.0 cu. ft. per pound of volatile solids added. This gas was used for operating gas engines to drive pumps and compressors. The average monthly value was computed at $1927.83 or 41.04 cents per 1,000 cu. ft. of gas.

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Low Cost Dirt Road Grading

Our most effective piece of equipment during the past year was a Domor grader attachment for a No. 12 Caterpillar grader. With this equipment, we graded 30 miles of high type dirt road at an average cost of $500 per mile, excluding clearing, grubbing and drainage costs.—Glenn L. Johnson, County Engineer, Plattsmouth, Nebr.

Controlling Fly Problems Following a Flood

One of the aftermaths of the Missouri and Kansas River floods two years ago this summer was the tremendous fly production. This was due to disruption of garbage collection, to the 15,000 dead animals resulting from the flood and to the soaked grain and other foodstuffs. The latter cause was the major one. Control measures consisted of applying a BHC emulsion of 0.5 percent, a 5 percent DDT residual spray, and a DDT and Chlordane space spray. Spraying was continued until the entire area was cleaned up.

Milwaukee Cuts Weeds on Vacant Property

State law in Wisconsin requires the cutting of weeds on vacant property and the City Bureau of Street Sanitation acts as weed commissioner. Weed cutting is done almost entirely by motorized mowers, and in 1951 about $32,000 was expended on this work and charged to the property benefited. Likewise, the Bureau plows snow from sidewalks of vacant property, or from residence property by order from the owner, and assesses the cost against the property benefited. In snow removal, in addition to plowing the streets nine times, 30,000 tons of treated salt were applied to the streets.

Mechanical Equipment on a Short Road Surfacing Job

In the permanent improvement of a half-mile section of the previously unimproved Camp Meeting Extension Road, we used an Austin-Western grader with a scarifier attachment, a Hough Payloader with a ¾-yd. bucket and a 10-ton roller. The grader and the front-end loader did all of the excavating to the subbase. Then No. 4 slag was hauled in and bladed with the grader to proper elevation and grade, then choked with slag chips and rolled. The entire surface was then penetrated with a power distributor, sealed with another layer of slag and rolled again.—Levi Bird Duff, Director, County of Allegheny, Pittsburgh, Pa.

Activated Sludge Treatment for Individual Home Use

At Purdue University, Prof. Don Bloodgood has demonstrated that a small activated sludge plant is suitable for sewage disposal for individual homes. The treatment unit used consisted of a 227-gal. rectangular metal tank divided into aeration and settling compartments. The plant was tested for nearly two years, part of the time with a grinder toilet and part of the time with a flush toilet, with wastes equivalent to those from a family of three. A grinder toilet is deemed advantageous. No data are given on the quality of the effluent, but it is stated that offensive odors never developed in the system.

Ice-Free Roads Still Not in Sight

S. M. BREUNING,
Research Engineer, Cambridge, Mass.

IN recent months accounts have appeared describing a snow and ice-free road invented by Wilhelm Rademacher in Germany. It was reported that roads would stay free of snow and ice at temperatures as low as —60° and even —70°F. because an admixture in the surface course of the pavement, acting in conjunction with radioactive emanations from the earth would melt the ice. And, better still, this admixture was said to increase paving costs by only ten to twenty cents per square yard. It was further stated that the State Laboratory for Materials Testing in Hannover had confirmed Mr. Rademacher's claims.

The Joint Highway Research Project at the Massachusetts Institute of Technology, like many other organizations throughout the world, was skeptical but interested. Inquiries addressed to Mr. Rademacher brought no replies but correspondence with other people in Germany unfolded the story.

A recent article in "Strassen und Tiefbautechnik" (a highway construction magazine) gives a fairly good history of the claimed invention. Mr. Rademacher first thought of using high frequency current in connection with chemical preparations added to the top layer of pavement, but this was too costly and offered technical difficulties. He then developed an admixture to asphalt or tar which he called "Electroswa Clorcatrinat 999 A" or "E.C 999 A".

The "Niedersaechsisches Materialpruefamt" (State Laboratory for Materials Testing) in Hannover wrote that it had determined the freezing point only of this fluid for Mr. Rademacher, without knowing what it was to be used for. It was found to consist mainly of a concentrated salt solution. The laboratory has not tested or otherwise reported on its use for snow and ice-free pavements. It has prohibited his use of its name in connection with it.

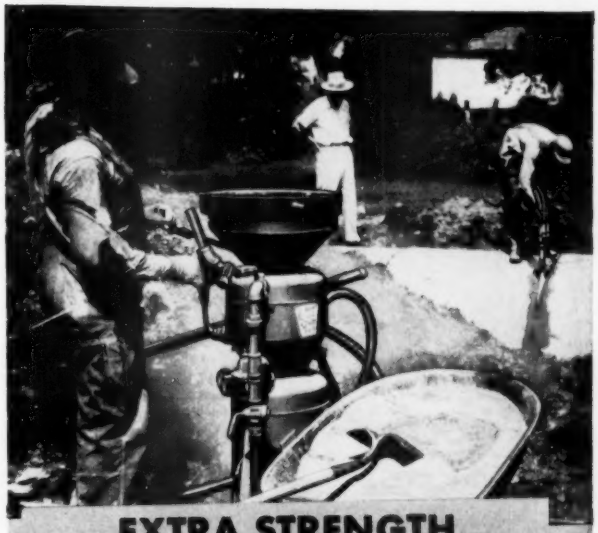
According to the magazine article, Mr. Rademacher asked the Department of Road Construction of the province of Schleswig-Holstein in Kiel for permission to use his invention on a road. The first test was on a seven-square yard area of bituminous pavement about 1¼ inches thick, constructed in the fall of 1951. Results were favorable at +27°F; below that temperature snow remained on the test area at the same depth as on the surrounding road.

A second test road was completed in the fall of 1952. It consisted of about 1800 square yards of 1¼-inch bituminous pavement with 8% of E. C. 999 A in the binder. This was a failure. The inventor then suggested a new test with a doubled quantity of his admixture. A third test pavement was completed on the last day of 1952, sixty square yards in area, 1¼ ins. thick, with 14% of the chemical added to the binder.

Results observed during January, 1953, were similar to those in the first test, but temperatures during the month were only a little below freezing. Complete data cannot be expected before 1954, when observations will be available for an entire winter.

Recent information from the Schleswig-Holstein Road Construction Department confirms that their tests with Mr. Rademacher's additive have shown no lasting results. For a few days after construction ice melted a little faster than on other roads, but thereafter there was no further observable difference.

ANOTHER BONDACTOR APPLICATION



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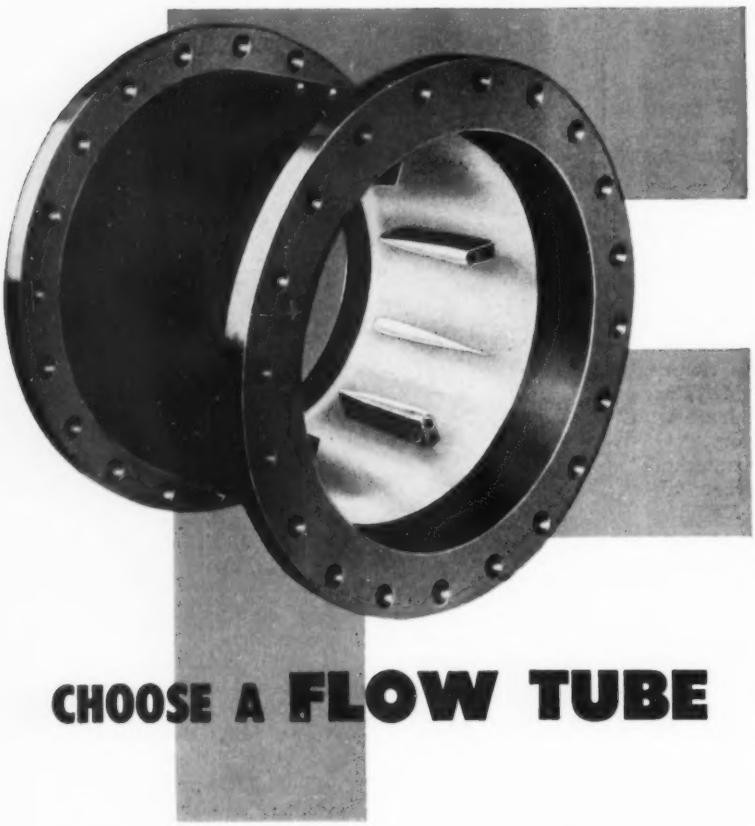

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New York-New Jersey-Connecticut Interstate Sanitation Commission 1952 Report

"A huge stride has been taken in the control of pollution in 1952. Sewage plants have been placed in operation capable of treating over 314 million gallons daily. This extraordinary accomplishment in a single year provides sufficient capacity to treat the sewage from any city in the United States outside of New York, with the exception of Chicago." With this statement, the Interstate Sanitation Commission begins its report of accomplishments during the year 1952 in eliminating pollution from the waters of the Interstate Sanitation District (Long Island Sound, the Hudson river south of Putnam County, the south shore of Long Island west of Suffolk County, and New York harbor and the connected bays) in accordance with a compact between the states of Connecticut, New York and New Jersey. Some 30% of the sewage discharged into these waters totaling about 850 mgd still must be provided with adequate treatment facilities, and extensions or improvements made to plants failing to meet the required standards for quality of discharge. Other matters demanding attention are the determination of reasonable means of "controlling sewage pollution from large ships which may create a condition incompatible with the Tri-State Compact," and of abating the effect of sewage pollution from small craft anchored in harbors on recreational and shellfish waters. The Commission expects that no raw sewage will be entering the District waters by 1959.

Industrial wastes entering these waters represent a total of over 500 mgd, but it is likely that but a small part of this total is of such nature as to require extensive treatment works.

The treatment plants completed and placed in operation in 1952 were the New York City plants at Hunts Point, Owls Head and Rockaway, Port Washington, N. Y., Linden-Roselle, N. J., and Fairfield, Conn.

There are now under construction, plants at New Haven, Norwalk, and Stratford, Conn.; Bayonne, Carteret, Edgewater, Elizabeth and West New York, N. J.; and Long Beach, New Rochelle, Peekskill and Port Richmond, N. Y. All of these provide primary treatment only, except for chemical treatment at Carteret and secondary treatment at Long Beach.

PUBLIC WORKS DIGESTS

THIS section digests and briefs the important articles appearing in the periodicals that reached this office prior to the 15th of the previous month.

WATER WORKS 115
HIGHWAYS AND AIRPORTS 122
SEWERAGE AND REFUSE... 129

THE WATER WORKS DIGEST

Bulldozer Grades Reservoir Banks

In constructing a 40-million-gallon reservoir at Salt Lake City, the contractor used a bulldozer for fine grading the banks. The sides of the reservoir were sloped 4 to 1 and they and the bottom were paved with concrete. In doing the final fine grading, old mine car rails were embedded in the slope with their tops set to finished grade, extending from the top to the bottom of the slope, in parallel lines spaced to the width of a bulldozer blade. The bulldozer blade of a heavy tractor was reversed, so that it could pull rather than push the dirt, as it backed down-hill. Having graded down between one pair of rails, it climbed back to the top of the bank and graded between the next pair. This graded the bank rapidly and smoothly.

"Reversed Dozer Blade Fine-grades Slope." *Roads and Streets*, March.

Rail Transportation of Public Water Supply

In Australia, low rainfall and high evaporation rates add materially to the difficulties of providing adequate water supplies. The supply for Broken Hill, New South Wales, has been obtained from two reservoirs, impounding the flows in two creeks with a total catchment area of 361 sq. mi. The average rainfall is only 10 in. per annum, and occasionally the supply fails to meet the demand of about 850 mg per year. When the water level in the reservoirs reaches a danger level, the water board provides essential supplies by rail from the Darling river, using eight trains a day, each carrying 91,000 gallons. During one drought from August 1944 to January 1946, trains carried 172 mg of water. In 1951, a total of 12 mg was brought by train. The water board now has under construction a project for bringing water from the Darling river to one of the existing reservoirs by means of a pipe line 61.75 miles long, most of which is laid above ground.

"Broken Hill Water Supply;" by H. Bowden Fletcher. *Water Works Engineering*, March.

Evaporation From Reservoirs

Evaporation from the surface of a reservoir may amount to as much as 9 in. a month, and measurements of evaporation furnish important data for water works investigations. A 16-month study of evaporation has been made by researchers of the Navy, Interior and Commerce Depts. In addition to findings on evaporation rates, the study helped establish relative merits of measuring methods. The accepted method of measuring loss from a shallow 4-ft. round pan was used. Study using four types of pan indicated that pan-to-lake relationships show pronounced seasonal variations, caused by heat storage in the large mass of the lake, so that coefficients developed from short-run tests are inapplicable as annual coefficients; and mean annual coefficients are not applicable for a close estimate of evaporation for any particular month. Two other methods of measurement were tried out—the "energy budget" of the reservoir and the "mass-transfer" method.

"Study Determines Lake Evaporation and Tests New Measurement Methods;" *Engineering News-Record*, March 19.

★ **HERE'S THE CATERPILLAR** mobile emergency power plant that recently high-balled 1200 miles to the aid of the municipal power plant at Sioux Falls, S. D. Leaving a show in Texas at 2 p.m. Jan. 23 it was carrying its part of the load at Sioux Falls 50 hours later.

Civil Defense For Water Supplies

In time of disaster, an adequate water supply for domestic use and fire protection is second only in importance to rescue and treatment of injured persons. In the set-up of the Massachusetts Civil Defense Agency, responsibility for this rests with a Section on Environmental Sanitation, under which are directors of Regional Civil Defense, and under them, directors of Local Civil Defense. It is planned to hold waterworks schools in each region. At these, emphasis is placed on the interconnections of public water supply systems where these are

practicable, and on the training of auxiliary personnel to supplement that permanently employed or replace any who may be disabled. Plans in duplicate of the distribution and supply works should be deposited in two different locations. Auxiliary sources of power should be installed for use in case of a breakdown in the electric distribution system. It is planned to train crews in the operation of water treatment equipment of a type used by the Army. An inventory has been made of all emergency water supply equipment and personnel throughout the state, as a part of the state civil defense program.

"Civil Defense for Water Supplies;" by Francis H. Kingsbury, San. Engr., Mass. Dept. of Health. *PUBLIC WORKS*, April.

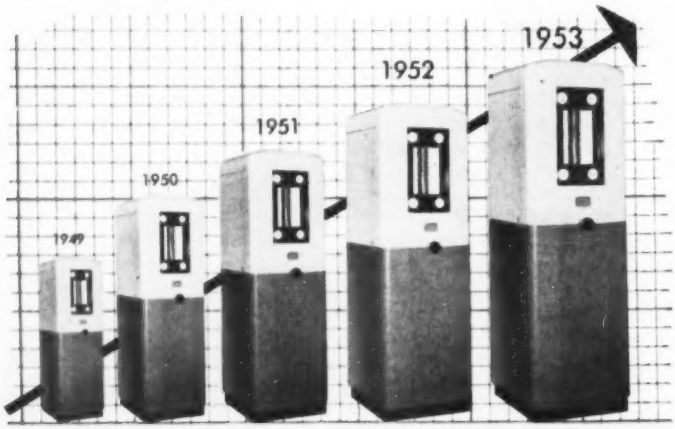
Miami's Lime Reclamation Plant

Early in 1949 the Dept. of Water and Sewers of Miami, Fla. put into operation what is believed to be the first *rotary-kiln* lime production plant owned by a municipality; and since July of that year it has operated almost continuously. This plant was quite generally described in technical papers at that time, and this article gives operating data, including financial. The author concludes that the results have been most satisfactory and show a worthwhile saving in cost of water treatment. During the fiscal year 1951-52, 19,883 tons of lime were produced, of which 2,728 tons were sold to outside customers, a small amount added to storage, and the rest used by the city's two softening plants. The operating cost per ton was $7.38. Calculating interest at 2.2% and depreciation at 1.5%, these total $30,254 for the year. The purchase price for lime at present is $20 per ton, delivered. The difference between what the lime used for water treatment would have cost if purchased, and the cost of producing it at the plant, showed for the fiscal year a profit of $183,664, on a plant cost of $817,672.

"Miami in the Limelight and at a Profit;" by C. F. Wertz, Resident Engr., Dept. of Water & Sewers. *Water & Sewage Works*, March.

Pneumatic Rollers For Earthfill Dams

Field tests of special types of pneumatic rollers conducted over the last five years have demonstrated to the satisfaction of soil experts of the Corps of Engineers that both time and money can be saved by the use of such rollers in the construction of rolled-fill dams. Using rollers built to specifications developed by the Corps as a result of these extensive test operations, it has been found possible to compact earth fills at about half the cost of obtaining comparable compaction by tamping rollers. Also embankment materials containing a high percentage of cobbles and large rock can be compacted in thick layers; in fact, the roller is suitable for the compaction of a wide range of both granular and cohesive soils to the densities required by design criteria; and at higher moisture content than with tamping rollers. Also operations can be resumed earlier following rain. The tests referred to began on the Dorena dam in 1947, and were continued on four other dams, in some of which sheepsfoot rollers also were used. Each experience led to changes in the specifications, which were developed to the latest, dated April 1952, which required use of a roller having a minimum of 4 wheels with tires of such size and ply that the pressure can be between 80 and 100 lb. under a 25,000-lb. wheel load, each wheel carrying approximately equal loads in



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traversing unequal ground. The body is such that ballast loading may be varied to produce individual wheel loads ranging from 18,000 to 25,000 lb. The entire assembly (roller plus tractor) must be capable of making a 180° turn on a 15 ft. radius.

"Pneumatic Rollers Cut Costs and Time on Earthfill Dams;" by George E. Bertram, Engr., Office of Chf. of Engrs. *Engineering News-Record*, April 2.

Loss of Chlorine in Distribution Systems

For many years, investigators have sought to explain the loss of chlorine and chloramine residuals in water distribution systems. The author has for several years been conducting experiments at the Brantford, Ontario, water works system, both in the laboratory and in the city's distribution system. He apparently demonstrated that the loss was not due to the presence of organic nitrogenous matter in the mains, but to the presence of ferrous iron in the water which entered it through corrosion; and chloramine, being an oxidant, uses itself up in attempting to oxidize progressively greater amounts of ferrous iron as it passes through the system. By preventing the solution of ferrous iron we can reduce the destruction of chloramine and chlorine residuals. One remedy would seem to be the use for pipe of some material other than iron; but this is impracticable since iron pipe is already in use in most existing systems. The author suggests that the final answer is in the treatment of the water so as to prevent its aggressiveness toward iron; as by the use of lime or soda ash, or one of the phosphates, or silica.

"Dechlorination Linked to Corrosion in Water Distribution Systems;" by Don B. Williams, In Charge of Purification, Brantford Water Works. *Water & Sewage Works*, March.

Micro-straining as an Adjunct to Sand Filtration

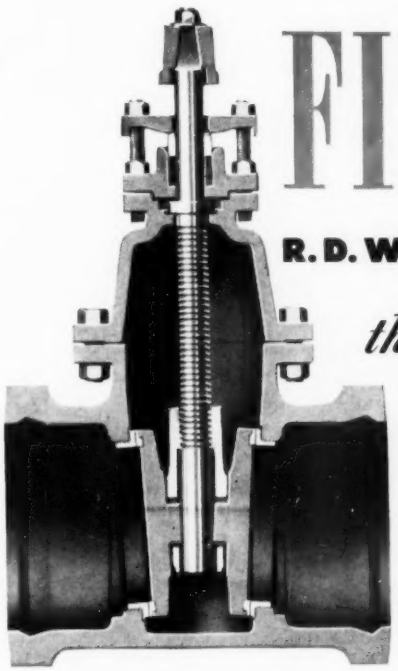
Micro-straining as practiced in England is filtration through a screen of fine-woven wire cloth, made of stainless steel wire 0.0024 in. in diameter, there being 80,000 to 135,000 apertures per square inch. A thin schmutzdecke forms on the surface which retains suspended solids even smaller than those caught by the fabric, while water passes through it at a much higher rate than is practiced through sand filters. The wire cloth is used on a drum screen, similar to the "North" screen, made with diameters of 2.5 to 10 ft. and revolving with peripheral speeds of 12.5 to 50 fpm, so that the water jets wash the deposits from the screen about once every 40 seconds. About 1% of the water treated is used for washing the screen.

Micro-straining is suggested to precede settling basins to reduce algae and turbidity of raw water; to increase capacities of existing filtration plants by permitting more rapid flows through settling basins and filters; and as a substitute for conventional water filtration methods for industrial supplies not requiring intense purification but an appreciable amount of clarification.

"Micro-straining;" by Arthur Wardell Consoer, Cons. Engr. *Engineering News-Record*, April 9.

Corrosion of Water Mains

Most waters used for public supplies do not corrode to the extent of materially weakening cast-iron pipe, as they do with wrought iron



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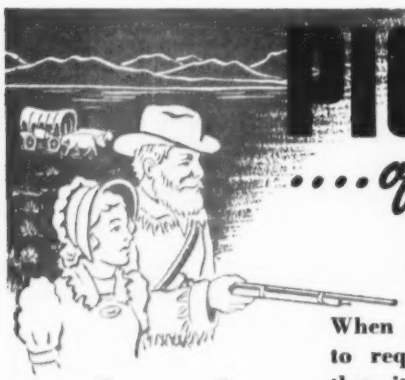
and steel pipe. The chief damage is the increased friction due to tuberculation. Certain waters, such as those of the Great Lakes, are not very corrosive to cast iron. But chemical treatment and filtration of such water without restoring it to the original pH increase its corrosivenss, cause the disintegrated coal-tar coating to be washed away from the pipe surface and allow corrosion to take place. Cast-iron pipe exposed to Lake Michigan water for 70 to 100 years generally has no coal-tar coating, but the pipe surface is coated with a thin layer of calcium carbonate, which gives excellent protection against corrosion; but this coating is dissolved by such water if it has been treated without restoration to the original pH. Waters that have a pH at the saturation equilibrium of calcium carbonate or slightly above generally prevent the formation of rust in piping coated with coal tar. Most waters can and should be treated to the extent that the water is saturated with calcium carbonate. Cement mortar coatings give promise of being much more permanent than coal-tar coatings.

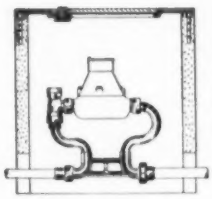


PIONEERS ....of these TIME-SAVING ECONOMIES

When a meter-servicing chore seems to require more time and bother than it is worth, Ford engineers usually come up with a new idea to save time and cut costs. Each of the products in this space was pioneered by Ford to solve an expensive service problem. It pays to refer your problems to Ford FIRST.

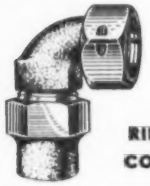
RESETTERS

Until the Ford Resetter was developed the only way to raise a too-low meter was to dig up and remake the setting. The modern way to do the job is to remove the meter from between the old couplings, insert the Resetter and connect the meter between the flanged copper tubes.



COPPERSETTERS

The Coppersetter is a complete meter mounting and has been widely adopted for outside meter settings in shallow and medium depth service lines. The word is copyrighted; there is no Coppersetter except that made by Ford.



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The Ringstyle idea of putting the meter nut on the coupling body from the flange end permits designing meter couplings for attaching direct to iron pipe or copper tubing. There are savings in fittings, joints, labor and space.

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"Corrosion Studies;" by John R. Baylis, Engr. of Water Purification, Chicago. *Journal, New England Water Works Ass'n*, March.

Well Maintenance

The most common causes of well failure are clogging, incrusting or corroding of casing openings or screens; pumping at rates in excess of the rate of replenishment; and those due to faulty initial well construction or mechanical deterioration of the well. There are at least 5 forms of corrosion—direct chemical, dezincification, intergranular, galvanic or bimetallic, and concentration cell. Two methods for offsetting corrosion in common use are protective coatings and the use of highly corrosion-resistant metals, neither wholly effective. No way is known for preventing incrustation; where present, removal of it should be a regular item of maintenance. Acid treatment is the most common method of removal. The operator should keep informed about the condition of his wells by making periodic readings of water levels, pumping levels, quantity pumped and power consumption, and record the data for future reference.

"Fundamentals of Water Well Operation and Maintenance;" by E. W. Bennison, Office Engr., Edward E. Johnson, Inc. *Journal, American Water Works Ass'n*, March.

Thermistors for Depth Thermometry

In limnological studies, accurate temperature measurements at various depths in reservoirs are very important. The means used include the reversing thermometer, the depth sampler with ordinary thermometer, and the electrical resistance thermometer. The last offers the great advantage that the temperature-sensing device need not be brought to the surface each time a reading is taken. The best temperature-sensing device uses a thermistor — a thermally sensitive resistor with a high negative temperature coefficient of resistance. The type most adaptable for depth thermometry is the Western Electric Type 14A thermistor. Thermistor units have been used at Los Angeles to obtain complete thermal profiles of all major reservoirs. These are plotted on graphs, and by comparison with those of previous years it is often possible to predict reservoir conditions, including overturn.

"Thermistors for Depth Thermometry;" by William R. Ree, Jr., San. Engr. Asst., Los Angeles Dept. of Water & Power. *Journal, American Water Works Ass'n*, March.

• • •

Reports From the Field

WE HAVE A Case SI tractor with Lull front-end loader. We use it to load gravel in the summer and load snow in the winter. We use the hydraulic lift for setting fire hydrants and other heavy materials. On the rear of this tractor we have a Henry backhoe with an 18-inch bucket. We will use it this year for digging 2,000 ft. of water line and 600 ft. of sewer line trench. It is one of the best investments our village has made. The men that work with it call it the "backsaver."—Norman Ungerman, Sup't. of Public Works, Cuba (2,500), New York.

WE CONSTRUCTED a leaf loader by taking an old dump truck, shortening the wheel base and mounting a fan and 35-hp industrial motor. Pick-up funnel was located just to the rear of the left front wheel, in full view of the operator. A truck is hitched behind the leaf loader and the truck driver drives the leaf loader. Personnel used is the truck driver and one laborer. J. B. Lambeth, Director of Public Works, Raleigh (65,500), N. C.

FORD TRACTOR with Pippin backhoe and Wagner loader is used for water main extensions and repairs under the supervision of H. R. Frye, Water Superintendent, and Stanley Tasker, Sewer Superintendent. This equipment is a good investment. J. F. Moring, City Engineer, Evanston (73,000), Ill.

• • •

Increased Water Use

(Continued from page 82)

was needed; 7 reported a low water table and 7 gave reasons not easily classified; 4 expected shortages because of industrial growth; and 3 reported each of the following: Lack of adequate transmission line capacity, inadequate supply, and inadequate facilities.

Water Works Problems

"What is the biggest problem facing your water department" was a question that brought in a whole flock of replies—480 of them out of this batch of questionnaires alone. "Expansion to keep up with population increases" was the answer by 144 cities, 30 percent of those included in this tabulation. Next in order was "We need a new water supply" by 79 or about 16.5 percent of the total. In 76 cities, the big problem was renewing old mains and services and installing larger pipe to care for the increased flows. In 51 cities, the problem was inadequate storage to care for peak flows and to maintain adequate pressures. In 36 cities, the quality was unsatisfactory and treatment was deemed necessary to improve taste, odor, hardness and other desirable factors. In 31 cities, it was the old problem of "Low revenues." Not enough help was the plaint of 12 cities; 5 had trouble controlling the use of air conditioning water; and 38 others reported numerous minor types of problems.

Computing the Data

As previously stated, the sampling was done in two steps—300 replies in the first batch and an additional 300 in the second batch. The percentages on the two were then compared and since none of

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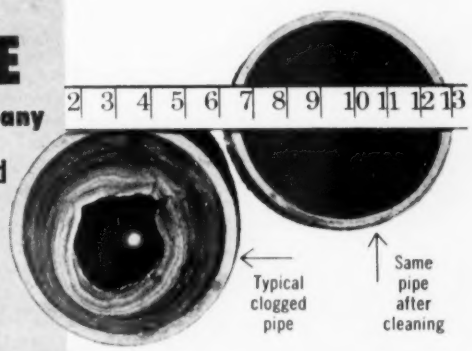
cleans clogged mains for about 1/30 the cost of replacement!



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How much to clean your clogged mains? Send for our Preliminary Job Cost Estimate form. Take five minutes to complete this form and return it to us. We'll give you a free estimate on the cost of cleaning your pipe—stacked, stored or underground.

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the percentages had been modified materially by the addition of the second batch, the tabulation was not carried further. This is in accord with our own and all other experiences—that after an adequate sample has been taken, geographically and by size of community, percentages do not change significantly thereafter. It is therefore believed that these data herein may be extended to include the 3,628 water works serving communities of 3,000 or more population by multiplying by 6. In other words, for instance, we believe it is perfectly safe to assume that nearly 500 cities had a water shortage last year; and that the reasons for such shortages will be in the same proportion as those given previously.

Improvements

It is of interest to note that 166 of the 600 cities reporting in this first tabulation plan to install fluoridation; that 116 plan new or added water storage facilities; and that 208 plan increased water supply or new water works facilities.

The outlook for improved water supplies for the coming year appears good. Whether it will be possible for most cities to overcome their shortages of basic water supply and of administration, so as to meet their problems promptly remains a problem for the soothsayer or the seer.

• • •

Elevated Storage

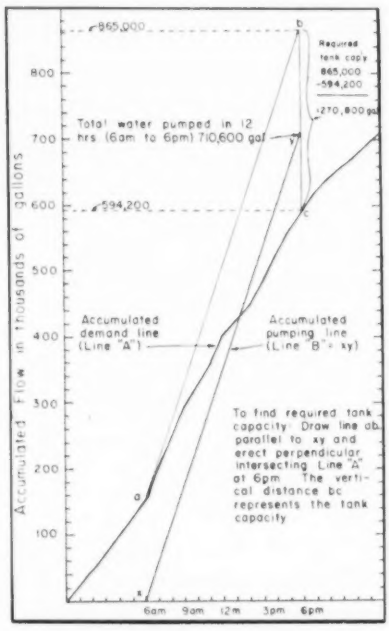
(Continued from page 75)

the difference between annuities representing investments in tanks of the sizes under consideration.

Example 3—12-hour Pumping

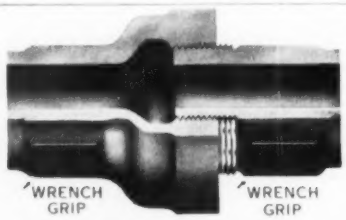
For small communities, the problem most frequently encountered is that of providing for pumpage only during daylight hours. In a real estate subdivision, for example, it may be desirable to limit pumping to the hours between 6 AM to 6 PM. For small subdivisions it is usually advisable to provide storage capacities much larger, relatively, than indicated in either of the two cases that have been cited. Capacities equivalent to 100 gallons per capita per day or a full 24-hour storage are not unreasonable for small developments. Fire requirements may dictate capacities even more liberal than that. However, some subdivisions approach the size of medium communities and the storage requirements are similar.

The mass diagram method of determining the required storage ca-



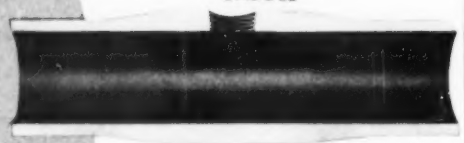
● **MASS DIAGRAM method for 12-hr. off-peak pumping—Fig. 3.**

McWANE 2" & 2¼" THREADED CAST IRON PIPE



2½" OVERSIZED THREADS

SADDLE



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Untrained workmen just screw it together. The joint is leakproof—and is the strongest section of the pipe due to its 2½-inch oversize male-and-female threads.

A favored method is to place the 18-foot factory-assembled lengths on skids over the trench, start the screwed joint by hand, tighten with a wrench. As the skids are pulled out, the flexibility of the line allows it to settle to the bottom of the trench. Use of a standard expansion joint is recommended about every 108 feet.

McWane Threaded 2-inch and 2¼-inch is the only pipe of its kind with 4 integral-cast tapping collars on each 18-foot length. Taps made through these collars save the cost of clamps. Wet taps in sizes 1" and smaller are made by using the tapping saddle, as illustrated. For further details, write

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pacity when pumping only from 6 AM to 6 PM is illustrated in Fig. 3. The principles involved and the amount of water consumed are the same as in examples 1 and 2.

Summary

There are many benefits and advantages in having elevated storage on the distribution system. Among them are the following:

1. Improved pressure in remote areas.
2. Improved fire protection and low fire insurance rates.
3. Reduction of fluctuations in pressure.
4. Avoids interruptions in service during repairs to mains.
5. Equalization of pumping heads, permitting selection of pumps for operation at highest efficiency.
6. Operation of pumps and treatment plants at constant rates.
7. Possible use of one-shift or two-shift pumping operations.
8. Possible use of smaller supply mains.
9. Economies from operation at off-peak periods when power rates are low.

Elevated storage should usually be located in or near the areas where improvements in pressure are needed, preferably on the opposite side of the grid system from the pumping station. The mass diagram provides a simple method of determining required storage capacities and furnishes much information of value to the designing engineer. Once installed, elevated tanks require the same kind of careful maintenance that is needed for any waterworks structure or appurtenance. Altitude valves and other controls on multiple tank systems should also be selected with care and properly maintained. If given reasonable attention, however, elevated storage facilities will provide a valuable service.

References

1. Dawson, John Howard, "How Pumping Rate and Storage May Affect Water Costs", *Public Works Magazine*, August 1950, p. 32.
2. Burdick, Charles B., "Storage on the Distribution System", *Water and Sewage Works*, April 1948, p. R-105.
3. Hawson, L. R., "The Distribution System", *Water and Sewage Works*, June 1944, p. R-79.
4. Babbitt, Harold E., and Doland, James J., "Water Supply Engineering", New York: McGraw-Hill Book Company, Inc., 1949, p. 328.

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PUBLIC WORKS DIGESTS

THE HIGHWAY AND AIRPORT DIGEST

Failure of Slag and Limestone Foundation

A road in Holland built with a foundation of blast furnace slag covered with a layer of limestone was found, 18 months later, to be deteriorating badly. It was found that part of the limestone had changed into a white powder. It is thought probable that this disintegration of the limestone was due to iron decomposition of part of the slag under the influence of groundwater, the level of which was so high as to bring it into the slag. The decomposing slag would give off large amounts of H_2S, which could not escape through the asphaltic surface course and, retained in contact with the limestone, gradually decomposed it through chemical action.

Bijzondere Reschadiging van een Fundering;" by Dr. Ir D. Thoenes. *Wegen*, February.

Protecting Maintenance Gangs

Replying to an inquiry as to what highway officials in different states and counties do to protect their maintenance gangs against injury by traffic, most of the officials reported using portable signs, barricades and red flags. Flagmen, where used, are stationed at horizontal and vertical curves, where sight distance is limited, and wherever one-way traffic is necessary. But the best insurance against injury or death appears to be the alertness of the men themselves. Wayne Co., Mich. uses large signs on rollers drawn behind trucks, rubber cones, and advance warning signs. All trucks are equipped with flashing lights which operate constantly and are visible for a distance of ¼ mile on bright days and ½ mile on dark ones. Connecticut also uses red flashing lights on all trucks. Pennsylvania Highway Dept. uses a half-barricade mounted on small wheels and rolled along as the work progresses. Several of the states report no success in educating the public to have regard for the safety of men working on the highway; but other states report just the opposite. Muscatine Co., Iowa, reports that the public conforms if the proper warning has been given, and they have had no accidents to maintenance employees.

"Safety of Men Working in Traffic;" *Better Roads*, March.

Repairing Spalled Sidewalks

Yakima, Washington, a few years ago, desired to repair thousands of square yards of concrete sidewalks which were badly spalled, probably due to over-troweling when constructed. Entire reconstruction seemed to be financially impracticable and unnecessary if some method could be found of surfacing with a material that would bond satisfactorily to the old walk, withstand Yakima's very hot and very cold weather and heavy traffic. Several test panels were laid, using asphalt in several ways. The final selection was an asphalt emulsion sold by the American Asphalt & Bitumuls Co. under the name of "Laykold Binder." A patching mastic was mixed using a calcium aluminate gypsum cement for quick setting. This was topped with a thin coat of "Wearcoat." The pavement was not closed to traffic more than one day. About 16,000 sq. ft. of this work was done by the city's own men very satisfactorily, for an average cost of 8¢ per sq. ft. for material and 12¢ for labor.

"Sidewalk Patching Need Not Be a Headache;" by Grant E. Huey, Com'r of Pub. Wks. *PUBLIC WORKS*, April.

Reworking Bituminous Pavements

Virginia Dept. of Highways since 1951 has been reworking old bituminous pavements on middle-class roads built 25 or 30 years ago by a method of which the following de-

Rubber Traffic Guard Posts Are Being Tested

RUBBER guard posts have been installed to replace steel posts at a point where three fatal accidents have occurred. Made of a very high-tensile compound in the form of a hollow tube, the post is slipped over a steel stub set in concrete. It is believed that the posts will be strong enough to withstand collisions but flexible enough to give way under the shock and prevent injury to the driver. That is, either the vehicle will be slowed or it will ride over the rubber posts. These first posts are being built by Goodyear Tire and Rubber Co.

● **TEST installation of rubber guard post at Cuyahoga Falls, Ohio.**

scription is typical. Depth and quality tests were run on the existing base material to determine how much additional base material to add. First, the bituminous mat and 6″ of the soil beneath and also 12 in. width of shoulder on each side were scarified and pulverized with a Wood Preparizer, and brought to the approximate standard cross section by motor graders. Then crusher-run stone was spread to the predetermined thickness and mixed with the material below to secure a homogeneous mixture at least 8 in. thick, adding water when necessary to secure optimum moisture content. Then, using motor graders and a 7-ton rubber-tired roller, the surface was shaped to the desired cross-section and opened to traffic. For about two weeks the road was maintained with the machining and watering necessary to secure compaction and maximum surface consolidation. Then a prime coat of 0.3 gal. per sq. yd. of RC-2 was applied, covered with 25 lb. of ½-in. aggregate, and followed by mixed-in-place treatment with a motor paver, using 70 lb. per sq. yd. of ½-in. aggregate with 0.6 gal. of RC-2, choked with 10 lb. of ⅝-in. aggregate.

"Reworking of Bituminous Pavements:" by H. H. Harris, Maint. Engr., Va. Dept. of H'ways. *Roads and Streets*, March.

Establishing Street Grades

In establishing street grades, the most important features to be considered are the residential and commercial buildings; 2nd is the sidewalk; 3rd is the curb; and 4th, the roadway. The "established grade" should be the elevation of the inside of the sidewalk (the street-property line). The sidewalk should slope toward the curb with a fall of about ⅛ in. per foot; and ¼ in. to 3 in. per foot from the outer edge of the sidewalk to the curb. The height of the curb should not exceed 6 in. Where the sidewalk pavement is continuous from building to curb, the slope should not exceed ½ in. per foot. On sidehill streets, the curbs on opposite sides should seldom be at the same elevation; making the street cross-section more nearly approximate that of the ground surface gives a better general appearance and less damage to abutting property; but the tilt probably should not exceed 3 ft. for a 40-ft. roadway. The curve of the roadway cross-section should be

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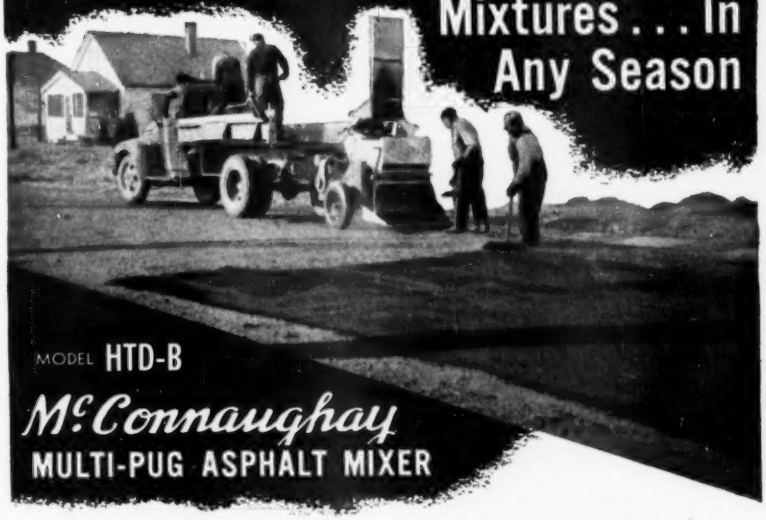

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symmetrical with respect to a cord joining the gutters.

"Suggestion for Establishing Street Grades;" by H. L. Leibee and R. L. Smith. *PUBLIC WORKS,* April.

Road Maintenance Practice in Ontario

The Ontario Dept. of Highways has almost completely mechanized all its maintenance operations. It has standardized the snowplow hook-ups so that all plows are interchangeable from one truck to another. The plow blades also are being standardized as to bolt-hole size and spacing. Three-ton trucks with one-way plow are used only for slushing and light snowplowing; 5-ton trucks with one-way or V-plow with wing is used for normal plowing; and a 10-ton truck with one-way or V-plow with wing is considered the only unit satisfactory for heavy snowplowing. The department has been trying to develop equipment that will spread bulk materials (gravel, sand, etc.) accurately in the desired quantities, in front of the driving wheels; carry the load evenly without elevating the truck box; eliminate the need for men to be exposed to weather and to the hazard of working on the back of the vehicle; and provide for more rapid coverage of the road.

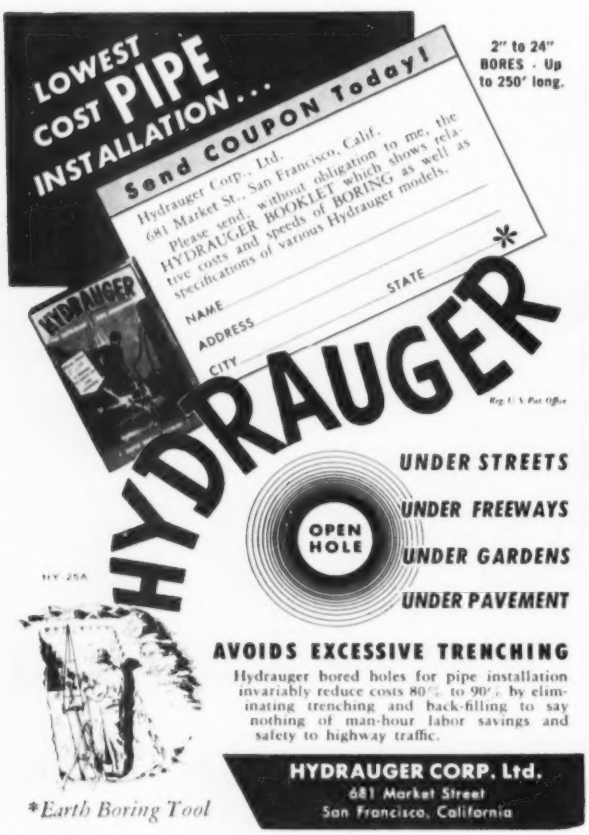
The department mulches newly graded roads as soon as possible after construction, thus providing an all-weather road and conserving all the gravel placed on the road; and if any deficiencies develop in the foundation, corrective measures can be taken prior to construction of a high-type pavement.

"Highway Maintenance Problems Solved by Research;" by John Walter, Engr. Ontario Dept. of Highways. *Roads and Engineering Construction,* March.

How California Uses Aerial Photography

California Div. of Highways has found that use of aerial mapping methods, properly combined with conventional ground surveys, makes it possible to develop plans more rapidly and at a substantial saving in cost over older methods. They have developed certain practices which appear to have outstanding value and which are described at length by the author. The most important are summarized as follows: (1) Control surveys are made to modified second-order accuracy, generally tied to California Coordinate System with control net extended for highway use. (2) Permanent points in the control net may be either key property corners, existing monuments, or new points selected for later use. (3) Complete notes of observations and adjustment are furnished by the mapping organization to the highway engineer. From the maps so obtained it has been possible to project a located line with computed ties to points of known position in the control net, complete the design, compute quantities, write deed descriptions for right-of-way, and go to contract with a minimum of additional field survey work. Such maps for over 200 miles of highway have been contracted for by the department during the past two years.

There are some limitations if these maps are to be used for final location and design. If the ground cover completely obscures the surface, the best that can be expected is that the contours will be within half the height of the cover. The general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usefulness of aerial contour mapping is on entirely new locations. In flat terrains where earthwork quantities are very light, probably the cost of an aerial contour map would not be justified, and the cheaper planimetric map is preferable. In contracting for aerial surveys, the specifications conform to the National Standards of Map Accuracy which have been adopted by the major governmental agencies.

"Photogrammetry: Specifications and Practices for the Use of Aerial Surveys;" by Edward T. Telford, Traffic Engr., and L. I. Funk, Asst. Dist. Engr.,, California Div. of Highways. *California Highways and Public Works*, February.

• • •

Concrete Saw Used to Cut Vertical Wall

Anderson Brothers Contractors of Rockford, Illinois recently used a Clipper Concrete Saw to saw vertically up concrete walls at the Ingersoll Milling Machine Company's Rockford plant.

This new and unusual sawing procedure was done in order to "tie in" new construction with the existing structure. By sawing to approximately ¼ the wall depth with a Model C-130 Clipper, Anderson Brothers were able to tie into the existing building wall; the sawed line confined the breaking of the concrete, leaving a smooth, neat existing corner post to which to anchor the new construction.

This vertical sawing was made possible by placing the Clipper "ConSaw" on a winch operated platform and raising the saw and operator as the job progressed. The blade guard of the saw was mounted at such a position that the front edge of the blade was exposed rather than the lower portion. The entire saw was moved upward by the saw operator elevating the platform by means of the winch.

• • •

Jet Aircraft Do Little Damage To Airfield Pavements

Under normal operating conditions, there is no serious damage from heat, blast or fuel spillage from jet aircraft on airport pavements. The word "normal", however, was strongly emphasized by the speaker, Gayle McFadden, of Washington, D. C., who is Chief of the Airfield Branch, Engineering Division, Office Chief of Engineers of the Army. He spoke at the San Francisco meeting of the American Society of Civil Engineers.

Tests by the Army in collaboration with the Air Force were begun, in the latter part of 1951. Summarizing the conclusions, Mr. McFadden said: "The degree of the effect of jet aircraft on airfield pavements, both from heat and blast and from fuel spillage, is directly related to the characteristics of the aircraft.

"Portland cement pavements are not affected by jet aircraft except for damage done to the joint sealing material. Certain joint sealing materials now being manufactured as

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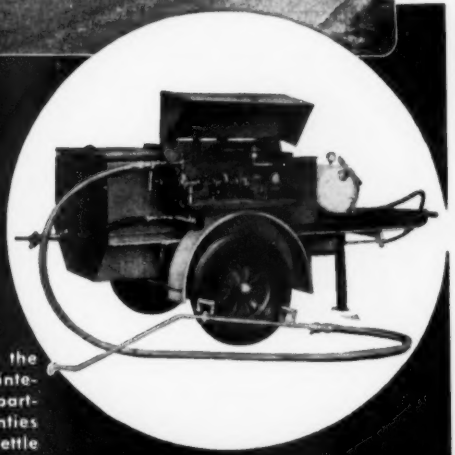

is the most sensible buy on the market. Here's the black-top maintenance unit for Highway Departments, Contractors, Cities, Counties and Park Departments. It's the kettle that gives a continuous flow of materials. Turn on the Hand Spray or Motor Spray Attachment and spray, no waiting for melted material. Open the Draw-Off Cock and immediately there's material for filling pouring pots.

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So when you spend those maintenance dollars get the Kettle that gives long life, fast heating and economy in operation. Get one-hundred cents of value for every dollar spent. For further details on the 84-HD write for Bulletin No. 1.

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'jet-resistant' are affected by heat and blast but are to a large extent resistant to fuel spillage. They are generally satisfactory to the operation of most jet aircraft.

"Inspection of asphaltic pavements and investigations of the effect of jet aircraft on their performance indicate that (a) well designed and well constructed dense-graded hot-mix asphaltic concrete pavements resist satisfactorily both the heat and blast and the fuel spillage of most airplanes under normal operating conditions, (b) old dense-graded hot-mix asphaltic concrete pavements are more resistant to jet fuel spillage than newly constructed pavements, and (c) thin surface treatments are not satisfactory for sealing porous pavements against fuel spillage."

• • •

Leo Ritter

(Continued from page 14)

By varying the pigments, almost any desired color may be obtained and it is recommended for center lines, lane lines, barrier lines, and other similar marking purposes. Keese estimates a service life of from three to five years for stripes which receive relatively light traffic wear on asphaltic surfaces. Although the durability varies with conditions, the plastic stripe should give a longer service life on any asphalt pavement than the standard traffic paints; service life on portland cement concrete pavements has been variable. It's worth looking into, if you have a stripe maintenance problem.

Highway Safety: There's a nice little article entitled "How Safe Are Our Highways?" in the March issue of the "Highway Builder", the magazine published by the Associated Pennsylvania Contractors. After using some very dramatic statistics to point up the magnitude of our highway safety problem, the article concludes with a plea for increased public understanding, support and funds to provide more safe roads geared to modern traffic needs. This business of selling John Q. Public on the highway programs and the benefits to be gained from improved highway transportation is a basic obligation common to all of us.

TV Program: We really enjoyed the treatment accorded the highway program in brief portions of the TV program "Omnibus" during March. Coverage was given to things like traffic engineering, highway planning, design and construction—all very neatly presented. This program is presented under the auspices of the Ford Foundation and is on view on Sunday afternoons in the New York area. Wish somebody could persuade the big money in the highway business that an hour or so a week on television or radio would be a worthwhile investment in the future of highways in this country.

S.M.S.: Recently had the opportunity to hear Sidney M. Shapiro, Chief Engineer of the Long Island Park Commission, informally discuss some of the extensions and improvements to be made on the parkway and expressway system in the New York Metropolitan Area. Traffic volumes carried by these facilities in this area are simply astounding. For example, the Southern State Parkway, in Nassau County on Long Island now is a narrow (40-foot) four-lane divided highway with a very narrow central divider; yet in 1952 it carried 22 million vehicles, an average of slightly more than 60,000 vehicles per day. Costs are also out of this world, as the Cross Bronx Expressway, now under construction shows. It is 5 miles long and will cost about $55 million for construction alone. An interesting fact is that a number of 8-story apartment houses in the path of this improvement are being moved bodily and intact to new locations. An interesting sidelight of Mr. Shapiro's talk was that a prediction made in 1937 estimated that the Triborough Bridge connecting Manhattan and Queens would carry 8 million vehicles per year by 1952; last year it carried 35 million vehicles.

From Here and There: President Eisenhower, in an apparent move to forestall the growing demand by state governments and other groups that the federal government withdraw from the field of gasoline taxation and others, has asked Congress to set up a study committee to survey the entire field of grants-in-aid activities and associated problems of finance and federal-state relationships. The Pennsylvania Turnpike Commission, reporting on an exhaustive study of car and truck accidents on the Turnpike System, says that speed is not the main cause of accidents, since the peak percentage occurs at speeds of from 41 to 50 miles per hour.

Presumably by the time you read this, the process of picking the winners in the General Motors Essay Contest will be completed, or nearly so; maybe then we will have a new solution to the nation's highway ills. Personally, I'm wondering what GM is going to do after the contest is over toward putting the many worthwhile ideas which are undoubtedly contained in the winning essays into action; let's hope they don't just die on the vine, so to speak.

• • •

Street Patching

(Continued from page 81)

the temperature of 300 degrees for the mix was obtained, and the aggregate thoroughly coated with asphalt. There was a total of 136 patches varying in size from 1 square foot to 47 square yards with a total patch area of 636 square yards. The average depth of patches was about 4 ins. These patches were made in November and December 1952. The labor cost was $1844.60; material cost $923.20; and equipment rental $672.00, making a total of $3439.80. Adding 10 percent or $343.98 for general supervision gives a grand total of $3783.78. Thus the cost was about $6.00 per square yard for patching in place or approximately $1.40 per square yard for each inch of thickness.

The City of Nashville has had a McConnaughay HTD Multi-Pug Asphalt mixer since 1951. This mixer has been in constant use winter and summer regardless of weather.

The emulsion used in both mixes was AE-90 modified, a medium breaking weather resistant emulsion manufactured and furnished by the Asphalt Products Company of Nashville, Tenn. We find by experience that such an emulsion will permit the use of damp aggregates and there is no dust from the mixer which is important when the mixer is used on the street.

We manufacture all of our cold patch material, using AE-90 modified. We make up 400 to 500 tons of cold mix at a central point and use from this stock pile as we need patching material. We find the material satisfactory and it can be left in stock pile for several months. A thin impervious skin forms on the outside of the pile. When this is opened, a very satisfactory cold patch material is exposed. The City uses about 20,000 tons of this material per year.

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Plastic Pipe Used for Gas Main in Tucson

Arizona's first plastic gas main installation has been completed by the Tucson Gas, Electric Light & Power Co. The pipe used was 2-inch, Kraloy 0-125 pipe. To replace about a mile and a half of existing line required only one and a half days working time, with two men laying nearly a thousand feet per hour. Sections of pipe were joined with a solvent cement very quickly. The light weight of the pipe also speeds up work, since one man can carry up to 400 ft. of the 2-inch plastic pipe.

● GAS main of plastic pipe.

Other advantages claimed for the pipe, which is said to be currently in use by more than a hundred gas and water utilities, include resistance to rust and corrosion and the smooth interior, resulting in unusual flow capacity. Also the pipe is not subject to ground current electrolysis, since it is a non-conductor of electricity.

● ● ●

Sanitary Land Fill Experience

In August, 1952, the City of Dawson, Georgia, instituted the Drott Method of Sanitary Fill. They purchased a TD-9 International Tractor equipped with a 2-yard Drott Bull-clam Shovel and began operations one block from Main Street in the business district. After a few months of operation, this community of 5,000 population has improved enough land for two building lots.

In spite of the location, there have been no complaints from residents or firms in the neighborhood. In fact, John Waller, Superintendent, says that "the Drott Bull-clam and Sanitary Fill has caused more favorable comment than any of the many civic improvements the city has undertaken."

● BUILDING lots from fill.

● ● ●

Dallas Water Department Adopts Mechanical Joint C. I. Pipe

For a number of years Dallas, Texas, was one of the few cities which used portland cement for jointing the bell and spigot cast-iron pipes of its water distribution system. It has announced that in the future it will standardize on mechanical joint cast-iron pipe and fittings for its distribution system.

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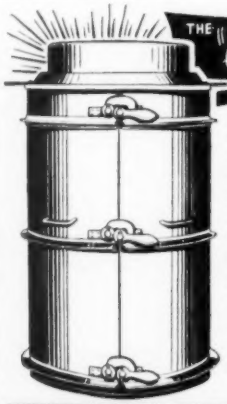

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Poliomyelitis and Sewage Treatment

It is known that the poliomyelitis virus has been found in sewage. Also it has been found in the effluents of sewage treatment plants. If there is a possibility that the disease is transmitted through sewage, efforts should be made to modify sewage treatment processes so as to inactivate the virus. But the author says that, while it is very likely that inactivation could be accomplished through modifications of the use of chlorine, the need for this is doubtful; that, "until specialists in virology and epidemiology can specifically point to poliomyelitis as a waterborne disease, sewage plant operators should concern themselves with improvements in normal plant operation."

"Sewage Treatment and the Virus of Poliomyelitis;" by Virgil W. Langworthy, Chemist, the Chlorine Institute. *Sewage and Industrial Wastes*, March.

The Future of Pollution Control

The President's Materials Policy Commission predicts that there will be a 100% increase in industry by 1975; that the production of synthetic fibers (nylon etc.) will increase from slightly more than 150 million pounds in 1950 to about 4 billion pounds in 1957; that of plastics from 2.28 billion to 9 billion pounds, and of detergents from 1.66 million pounds to 4 billion; and undoubtedly new products involving new chemical wastes will be developed. This vast increase in quantity of wastes will be accompanied by no increase—possibly by a decrease—in the water available for diluting them. The problem presented for preventing increased pollution of our streams is a staggering one.

In the field of pollution control, there are several areas of research that are obviously of major and primary importance. These include developing new techniques for determining the amounts and kinds of pollution present in streams, and their effects; and establishing better yardsticks for water quality objectives for bathing water, irrigation, public water supply, industrial and other. There is need to develop improved and cheaper sewage treatment methods, and methods for treating new types of industrial wastes. Adequate basic information is more important than ever before—rainfall and streamflow records, the use of water by industry, etc. and there is urgent need for the development of better procedures for following up research findings, for assuring that new knowledge is channeled to those who are in a position to use it in determining public policies.

"The Outlook for Pollution Control in 1953;" by Carl E. Schwob, U. S. Public Health Service. *Wastes Engineering*, March.

Biochemical Oxidation of Dairy Wastes

Five years of research by the U. S. Dept. of Agriculture has demonstrated that milk wastes could be oxidized in the laboratory, under

Modern Refuse Collection Units for Dickinson

TWO modern refuse collection units have recently been received by Dickinson, No. Dak., replacing two or three times as many open type refuse collection units previously used. Both of these new units are Pax-all compacting-type refuse loading bodies, with a capacity of 9 cu. yds. The packing bucket is ¾-yd. and its automatic loading and compacting cycle is controlled by a single lever on the curb side of the body. Because of the compacting features, these bodies will carry two or three times as much refuse as the open type. For dumping, a hydraulic hoist raises the body, which is slightly tapered, to an angle of 53°. Because of the taper and the dumping angle, all refuse is discharged quickly and cleanly. The bodies were made by the St. Paul Hydraulic Hoist Co. Vincent Miklautsch is Street Commissioner and Victor Hayes is Superintendent of Streets. Mr. Hayes is shown at the right with Mr. Miklautsch in the picture.

controlled temperature, aeration and flow, by aerobic fermentation using yeast cells; that one-half of the organic matter was oxidized by the microorganisms and most of the remainder assimilated into the cell tissues; and that by continued addition of air, these cells are oxidized by their own metabolism to ammonia, carbon dioxide and water. This elimination of sludge is a logical explanation of occurrences at a number of milk plants using the activated sludge process. The process is to be further developed at Pennsylvania State College.

"Biochemical Oxidation of Dairy Wastes;" by Sam R. Hoover, Agri. Research Administration, U. S. Dept. of Agriculture. *Sewage and Industrial Wastes*, February.

Incinerators vs. Sanitary Landfill

Economically, landfill and incinerators for disposal of refuse can compete on equal terms when the truck haul to the incinerator is 10 to 15 miles shorter than it is to the land fill. Operating cost for sanitary fills range from 40¢ to $1.35 per ton; incineration costs run above $3.00 per ton. The capitalized cost of incinerators exceeds $1,000 per ton of rated capacity; landfill requires only a tractor with a front-end loader and a dragline. (It is assumed that no purchase of land is necessary.) Fills require about 7 acre-feet per 10,000 people served, and about 6 men per 1,000 cu. yd. of refuse per day.

"Sanitary Landfill Economics;" by William S. Foster, Eng. Editor. *American City*, March.

Unusual Odor Control Method

The sewage of Oslo, Norway, is treated in two plants, one of which is an activated sludge plant, with preaeration and sedimentation. To control the odors from this plant, aerated fresh water is sprayed onto the surface of the sewage. It apparently does not mix with the sewage, possibly due to difference in gravity. This floating cover of aerated water inhibits odorous gases being discharged into the atmosphere.

"Sewage Treatment of Scandinavia;" by E. L. Knoedler, *Water & Sewage Works*, March.

Wellpoints Retained Permanently at Sewage Plant

In building the Ley Creek treatment plant for Syracuse, N. Y., wellpoints were used to lower the ground water during construction. These, with the pump, were left in place permanently, and now, when the tanks are to be emptied for maintenance or repair, the pump is operated to lower the ground water to prevent the tanks from floating when emptied. Thus it was unnecessary to make the tanks heavy enough to prevent uplift. An additional advantage is that the wellpoint system acts as a constant and dependable service water supply.

"Permanent Wellpoints Keep Sewage Tanks From Floating;" *Engineering News-Record*, March 26.

Planning a Plant Using Accelo Filters

Direct recirculation of unsettled effluent from a biological filter back to the inlet of the filter or to a preceding filter is the basic principle of the "Accelo" filter system. It can be used with either conventional-rate or high-rate filters. A typical plant layout of a high-rate Accelo filter includes grit remover,

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Griductor, Parshall flume meter, primary clarifier, wet well, control well, filter, effluent well, recirculation pump, final clarifier, digester, and sludge drying beds. For use with a conventional-rate filter the layout would be much the same but the filter would be larger. The entire plant must be designed to handle maximum flow rates. The distributor should be designed with a maximum discharge capacity equal to the total capacity of all recirculation pumps plus the average flow rate. Where lift pumps also are used, the entire plant and distributor should be designed to discharge a maximum volume equal to the total discharge from all pumps. If a distributor range greater than about 2 to 1 is required, a 4-arm distributor is needed, so arranged that 2 arms will discharge at low flow rates and all four at maximum flow.

"The Accelo Filter System of Sewage and Waste Treatment;" by H. W. Gillard, Infilco, Inc. *PUBLIC WORKS*, April.

Treatment of Sewage and Hosiery Mill Waste

Marion, North Carolina, in planning a sewage treatment plant in 1951, found that 10 industrial plants contributed wastes that would complicate the treatment of the municipal sewage, especially color removal. Nine of these were relatively small mills processing 4,400 lb. of hosiery a day and the tenth produced 16,000 lb. of dyed or bleached yarn. Jar tests were run on composites of these and domestic sewage to determine the best coagulant, and a plant designed for treating an average of 1.0 mgd was built about 5 miles from the center of the city. This included a 250,000 gal. basin for equalizing and mixing the industrial wastes; and a primary settling basin for wastes and two others for domestic sewage; provision for automatic proportioning of the industrial waste to the domestic sewage. There were also screens, comminutor, meters, flash mixer, flocculator, pumps, trickling filter, two digesters, and sludge drying beds. In order that the industrial wastes could be mixed with the domestic sewage in proportions, varying from time to time, adapted to give the most effective treatment, the industrial wastes and the domestic sewage are carried to the plant in two separate lines, the sewage in 15 in. pipe and the wastes in 10 in., using dual manholes.

Chlorine can be fed at three different points, sulphuric acid at three points. Provision is made for six alternate methods of treatment; the mixture of wastes and sewage can be settled, filtered and settled again with or without coagulation. Or the coagulant can be applied before the first settling. Or the domestic sewage can be settled and filtered, mixed with the industrial waste, and the mixture coagulated and settled. Or the domestic sewage is settled, the waste is coagulated and settled, and the two effluents mixed, filtered and settled.

"Sewage-Textile Wastes Plant Has Six Treatment Methods;" by John C. Grey, San. Engr. N. C. State Bd. of Health. *Wastes Engineering*, April.

Detergents and Sewage Treatment

Of the three classes of detergents —anionic, cationic and nonionic— which reach the sewers, only the anionic need be considered in connection with sewage treatment, as they are the only ones used in sufficient quantities to be of interest

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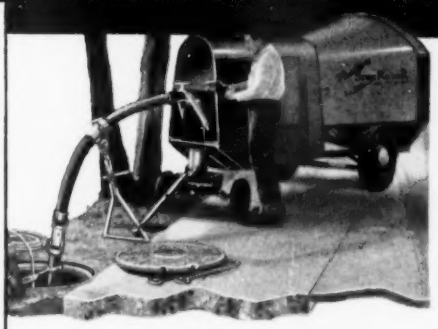

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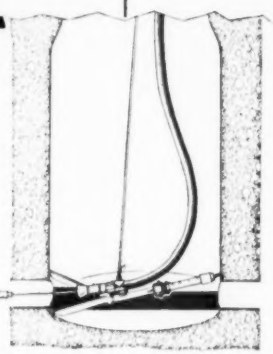

*This figure includes maintenance and parts replacement.

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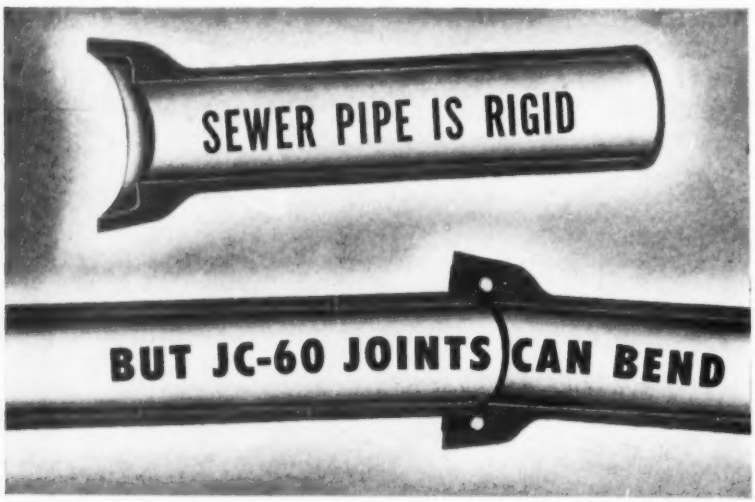
to wastes treatment personnel. Household detergents are mixed with other compounds, primarily phosphates, sodium sulfate, and alkaline substances. The great increase in the use of these detergents during the past few years has caused concern and general discussion, both in this country and abroad, as to their possible effect on sewage treatment. A number of plant operators are convinced that they cause frothing in tanks, especially in aeration tanks; it has been suggested also that they have an objectionable effect on the activities of bacteria necessary for waste disposal. A number of plant operators and manufacturers discussed the subject at a meeting of the Federation of Sewage and Industrial Wastes Ass'ns. A detergent manufacturer said: "There is no established proof that sudsing, or in fact any other problem of the ordinary sewage treatment system, has been caused by anionic detergent." But Willem Rudolfs said: "There seems to be considerable circumstantial evidence that frothing is more pronounced since the advent of increased detergent sales." Supt. W. N. Wells said "there has been a constant increase in the use of detergents since the late 1930's" and "the frothing problem has increased since the late 1930's; however, during this same period activated sludge plants have been operated at lower and lower concentrations of solids in the aeration tanks. Which is to blame, increased use of detergents or low solids?" Experiments were conducted in a plant at Bryan, Ohio, by Procter & Gamble Co. and it was found impossible there, as had been the case previously at San Antonio, to make the aeration tanks froth by adding synthetic detergent, even in relatively large amounts. Case histories of several other plants which experienced periods of serious frothing showed that they also had been carrying relatively low solids. "So far, no instance is known where solids adjustment has been tried where it has not controlled any troublesome frothing problem that may have existed." Said S. A. Greeley: "At New York, Los Angeles and Philadelphia, all with low suspended solids in the aeration tanks, there has been considerable frothing." As to other effects, Rudolfs suggests that the phosphates in household detergents may be partly responsible for the difficulties encountered and that detergents may affect the activities of bacteria; and Rutgers University investigators state that slime growths in sewers and some biological treatment processes "are influenced in various ways by the presence of synthetic detergents in sewage;" some stimulate slime growth, and decrease the oxidizing, purifying and nitrifying capacities of activated sludge. Fuhrman and Rice stated that detergents are wholly or partly responsible for changes at the District of Columbia treatment plant—reduction of per capita BOD of the sewage and of efficiency of the primary treatment units.

"Detergent Compounds — Their Composition and Behavior;" by Lawrence Flett and Lester F. Hoyt, Allied Chemical & Dye Corp. Discussion by Willem Rudolfs. "Action of Detergents in Sewage Treatment —A Study by Industry;" by W. R. Gowdy, Procter & Gamble Co. Discussion by W. N. Wells, Supt. Sew. Treat. Plant, San Antonio, Texas. "Effect of Detergents on Sewage Microorganisms;" by Raymond Manganelli and Edwin S. Crosby, Rutgers Univ. "Operating Experiences with Detergents at Washington, D. C."; by Ralph E. Fuhrman and John R Rice, Supt. & Chemist,



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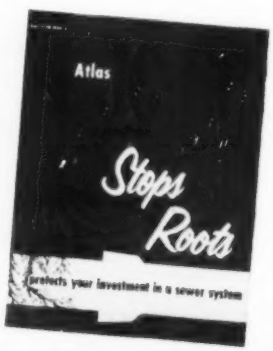

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D. C. Sewage Treat. Plant. Discussions by S. A. Greeley, Cons. Engr., and Harvey E. Berg, Nat'l Aluminate Corp.

Fine Screening For Milk Wastes

The sewage of Rochester, Minn., contains a large volume of milk wastes and the designing engineers feared that the use of conventional primary settling tanks would cause it to go septic. Therefore they provided, instead of tanks, screens with 10 meshes to the inch, through which the sewage passes before going to trickling filters. Sludge from the screens and final settling tanks is digested and vacuum filtered.

"Sewage Treatment Plant Completed;" *Engineering News-Decord,* March 26.

Composting Refuse in the Netherlands

Composting refuse has been practiced since the Middle Ages in the Netherlands, where conditions are favorable. At present, about 20% of the municipal refuse in Holland is made into fertilizer and 25% is incinerated. Composting is performed by a state-sponsored company, which charges the cities for disposing of their refuse and sells the fertilizer to farmers. The cities pay this company about as much as it would cost to incinerate. The profit derived from composting is practically confined to the improvement of the sandy soil.

"The Netherlands Finds No Gold in Composted Refuse;" *American City,* March.

Disposing of Indigestible Sludge

The sewage of Waterbury, Conn. contains so much metallic industrial waste, mostly copper, that it is impracticable to digest the sludge. Therefore the treatment plant was designed to dewater the raw sludge with vacuum filters. It is then dried in a C-E Raymond flash dryer to less than 10% moisture. An incinerator which destroys the city refuse is located near the dryer, and the waste heat from this is used to flash-dry the sludge. When desired, excess dried sludge is burned in the incinerator.

"Waterbury's Sewage - Refuse - Disposal Plant;" by Robert D. Mitchell, Cons. Engr. *American City,* March.

Doc Symons

(*Continued from page* 12)

to Betty, "Aren't you the sister of John Shute, with whom I went to high school?"—Long time, No See, and Small World!

★ ★ ★

Swedefinitions — "Modesty is that characteristic which permits a man to remain quiet while he hopes that everyone else will find out how wonderful he is."

"Poise is the ability to talk fluently, while the other fellow is paying the check."

★ ★ ★

I wonder how it will be to attend some mid-western AWWA Section meetings and not see Francis Cunningham, the Neptune Meter Man, who retired in March (along with Rollo Blanchard and several others). I'll never forget when the Wisconsin gang had a picnic, during the 1950 AWWA Convention in Philadelphia, at the home of "Jim" Myers, Exec. V. P. of Philadelphia Sub. Water Co., and former Badger.—Francis, bless his heart, showed up with

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orchids for all the ladies. I imagine that a number of others remember that occasion, too.

★ ★ ★

Hats Off To — Ross Dobbin, a former AWWA president, from Peterborough, Ont., who has been elected President of the Engineering Institute of Canada. Ross, about whom I've told some stories before, is going to resign as Mgr. of the Peterborough Utilities Comm., but there is no connection between the two events.

A. J. (Tony) Fischer, Chief Developer for the Dorr Co., who was voted the Federation's A. S. Bedell Award for service to the N.Y.S.I.W.A.

Harry Krum* (Allentown's Water Boy), longtime Allentown, Pa. City Chemist, who is a favorite bridge partner of the members of the Pee Bees, and who has been elevated to the position of Supt. of Water to replace "Bill" Schnable, who retired.

Ed Stapley, Dean of Okla. Inst. of Tech. of Okla. A & M, who was awarded honorary membership in the Engineers Club of Tulsa and was named "Engineer of the Month."

*Harry Krum, having just witnessed the completion of a new plant, stated that he desired to write an article titled "Call the Factory Man" or "Why doesn't this darn thing work?"

★ ★ ★

News Notes From Brushy Bend—The North Jersey Water Conference held its final meeting of the 1952-53 season on Friday April 10, at the Paterson YMCA, with free dinner tickets to all paid up members. Ed Walasyk of Hackensack Water Co. is Secy. and Harry Lendall, Retired Prof. of Civ. Engr. at Rutgers, spark plugs the programs.

The South Jersey Assn. of Water Superintendents held its 26th annual Planked Shad Dinner at the Salem, N. J., Country Club on April 24th. New Officers were elected—before dinner—Walt Spencer of Merchantville is Secretary.

The Metropolitan Section of NYSIWA held a meeting on Mar. 18th with papers on "Recording and Reporting" by Scanlon, Shapiro, and Fine; and on "B.O.D. and Endogenous Respiration of Bacteria" by Hoover, Jasewicz, and Porges. Prior to the meeting, a group met for supper at the Pearl St. Restaurant.

The Metropolitan Water and Wastes Society has elected new officers. Dr. Sidney Sussman is President and Paul De Falco, Secy.-Treas.

Manhattan College will hold a short school on "Instrumentation in Sewage and Industrial Waste Plants" on May 14. "Wes" Eckenfelder heads it up and has representatives from various equipment manufacturers scheduled to participate.

★ ★ ★

With the scent of spring in the air as I write this, I notice my mail is already containing hints of the Federation Meeting in Miami, Oct. 13-16.—See You There? ? ?

V.T.Y.—Doc Symons

• • •

Building a New City in the Canadian Northwest

A NEW city, Kitimat, must be built in the Canadian northwest to house the personnel of the plant, now under construction, of Alcan (the Aluminum Co. of Canada). To serve an immediate population of 7,000, the city is planned for an ultimate 50,000. Located on the Pacific, 400 miles north of Vancouver, Kitimat may soon become one of western Canada's large cities.

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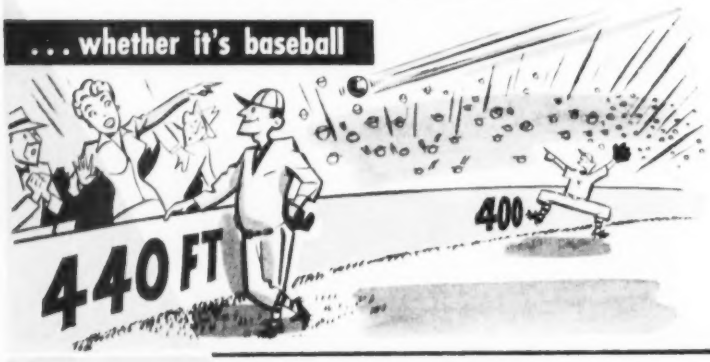

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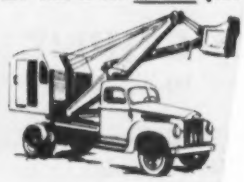

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new aluminum development is called, will reverse the flow of a 5,000-square mile drainage area and tap a 110-mile chain of lakes. A 10-mile tunnel will convey water to generate 2,000,000 horsepower. The aluminum reduction plant will be built on a tidewater arm of the Pacific. There is now no city other than the Pacific port of Prince Rupert in this area; villages and logging towns are the present communities.

Planning a city involves more than selecting a site, surveying the land and laying out real estate plots on a drawing board. Naturally, the selection of the site was determined by the topography of the country. It was the closest available site to the source of power where ocean port facilities could be developed and enough comparatively regular land was available for the two-and-a-half mile long smelter and the operating town.

However, drainage and water supply (water is plentiful in this land of heavy annual rainfall) were necessary considerations both for the plant and the town itself. Electricity will be abundant with the immense power generating facilities, probably to the point where all cooking and heating will be done electrically.

Alcan had a lot of experience in town planning with Arvida, Province of Quebec, a company-owned and built community. Some 30 years ago, Alcan mushroomed Arvida out of empty land and provided a pleasant community for the employees of its production facilities.

Applying the lessons learned at Arvida, Alcan is proceeding on the company-owned community plan with certain important variations. All municipal facilities will be constructed and operated by Alcan. Of course, it is to the company's best interests to provide the finest municipal services since the plant must use and depend on all of these services and the employees will be happier and more productive if their town is well-kept and efficiently administered.

The company will not attempt to sell necessary household items like groceries and gasoline. Instead, the best Canadian grocery chains and department stores will be invited to move into Kitimat and set up shop. The store structures will be built by Alcan to the specifications of the merchants and will be leased to them at an agreed rental. Just how the corner filling station and such emporiums as barber and beauty shops will be established has not yet been definitely settled. Very likely, the same general plan will be followed and once the company is convinced of the integrity of the individual merchants, the necessary buildings will be constructed and leased by Alcan to the operators. Overcrowding, improper balance between parks, schools, public utilities and population density will be avoided. The town plan makes it possible for children to go to school without crossing any through streets.

A group of architects and city planning engineers are responsible for this plan under contract to Alcan. Included in the group are Clarence S. Stein of New York; Mayer & Whittlesey, architects and engineers; and M. Milton Glass, town planner. Plans include outlines for possible methods of administration of the new city. Communication with the outside world is highly important. The present air and sea transport are insufficient to supply the needs of a large community which Kitimat may well become. Canadian National Railways is starting construction of a 40-mile branch line to Kitimat, connecting with the road's main transcontinental line from Prince Rupert to the east.

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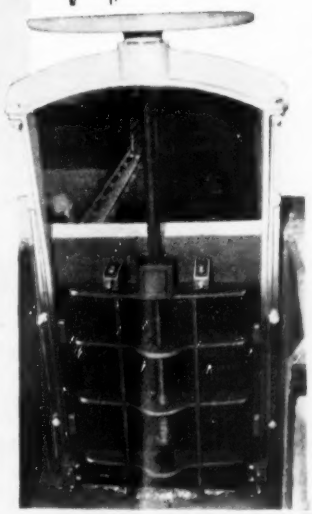

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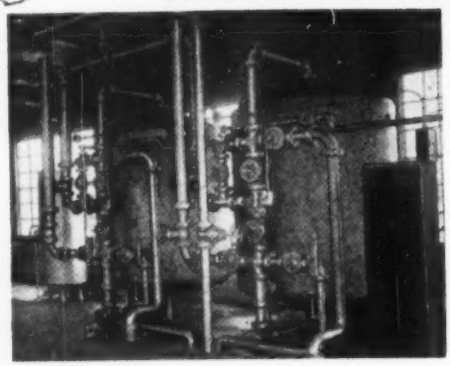

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Water and Highways

(*Continued from page 76*)

location of valves and hydrants leaving their main under 12 feet of fill. This was avoided only because of a later change in planning. Another community currently is faced with the expenditure of approximately $10,000 for line relocation and finds that the Highway Department can bear no part of this cost.

The Water Division of one of the large cities in Ohio spent over $36,000 in 1951 for relocating water mains and appurtenances to accommodate new paving projects, and foresees the expenditure of approximately $200,000 for the relocation of water mains in connection with a proposed expressway improvement. Another city has spent a probable $40,000 in the last three years on changing distribution facilities, and will likely spend as much as $75,000 in relocating feeder mains in connection with the present construction of an express highway.

The waterworks industry is always handicapped by any situation which requires an outlay of a substantial amount of ready cash. The very nature of its financial structure makes short term financing impractical. Waterworks financing is on a long term basis. Capital costs, which are usually a substantial part of annual expenses, continue for many years. Operating and maintenance costs are the same year after year, usually following only long term trends. As a result, fixed water rates, which are seldom changed, result in relatively small fluctuations in revenue, with meager surpluses, the expenditure of which is usually well planned before they accumulate. As a result, most water line relocations made necessary by highway improvements cannot be absorbed by annual operating and maintenance budgets—they are a capital expenditure for which no return will be realized.

Viewpoint of the Industry

Water lines and appurtenances are an essential part of public service. They have been installed and paid for in most instances by the water user. They rightfully belong in a location adjacent to the highway. This is indicated by experience and established by prevailing practice. The need for relocation is made necessary to provide better service to the highway user not the water user. Increased rates to water

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users for such financing is unfair and unjustified.

It is recognized that the lack of adequate planning for water line relocation in connection with highway improvements results in potential damage to pavements and traffic hazards. This and other factors creates reluctance on the part of some highway officials to cooperate with waterworks management in handling properly the construction of water lines within highway boundaries. Also, provisions for financing highway improvements have not included the cost of relocating water line installations because legislators have not recognized fully the necessity for relieving the waterworks industry of the financial responsibility.

This has led to a feeling within the utility field and among the municipal officials that highway planners are unsympathetic to their problem. This is an unfortunate and a destructive attitude, for full understanding and cooperation must be secured for constructive action. It must be recognized that the waterworks industry has done little to make highway planners and legislators sufficiently aware of the problem. Until this is done, highway planners will not recognize an obligation to the water user as readily as they do to the highway user. This is readily understandable and can be fully appreciated.

Highway engineers and officials are rightly very interested in meeting the demands on them for better roads. Their problem is a gigantic one—heavier loadings, more volume, faster moving traffic, death and accident statistics. I admire the fine job being done by the highway engineer. In a profession with changing standards and new design requirements continually facing him, it is forgivable if he has neglected somewhat the waterworks industry's problem.

Today, highway planners are men of broad vision. I believe that they would incorporate in their planning the provisions for carrying out required water line relocations if the problem were properly presented to them, and if they are properly implemented by law to do so.

The justification for relieving the waterworks industry of the financial burden of relocating water lines and appurtenances to provide for highway improvement is apparent. The proposition seems fair. There is required the development of a financial arrangement which will permit highway building authorities to as-

sist financially in those instances where water line relocation is required by reason of highway improvement. This can be brought about by the development of better understanding of each other's problems at all levels of authority. The problem must be recognized by responsible planning and financing agencies.

This article is slightly modified from a paper by Mr. Fuller before the Ohio Section of the American Water Works Association.

• • •

Heat-Treating Garbage

(*Continued from page* 84)

for small amounts of garbage, but requires care and attention. The garbage, as with steam cooking, should be held at 212° for 30 minutes.

DEHYDRATION, following grinding, is recommended for handling large quantities of garbage, but there is a question whether the virus is killed, even with the known high temperature of the combustion gases. Laboratory procedures have indicated that the virus can remain virile after dehydration.

AUXILIARY EQUIPMENT.—Recording thermometers will probably be required to give evidence that the time-temperature standards have been met for each batch of garbage. In addition to the recording thermometers, which should have a range of at least 50 to 300 degrees, spot-check dial thermometers with a rigid neck about 4 ft. long will be required.

Due to the fluidity of most wet-steamed garbage, it should be fed in troughs rather than on feeding floors. All concrete structures used in conjunction with treatment and feeding should be built of very dense concrete, preferably 1:2:3 mix with no more than 4½ gals. of water per sack of cement, in order to resist deterioration in the garbage.

NEEDED INFORMATION.—More information on equipment, operating characteristics, time - temperature relationships, desirable auxiliary equipment, and operating costs ar needed for the various methods of sterilization.

Information from hog growers experienced in heat-treating garbage indicates that the costs of such treatment are offset by the increased production of marketable hogs; and, in some instances, there has been income from the salvage of the grease resulting from the process.

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Public Works EQUIPMENT NEWS

Caterpillar tractor-shovel

Tractor-Shovel Digs, Loads, Bulldozes and Stacks

This new No. 6 tractor-shovel has a bucket capacity of 2 cu. yds. heaped or 1½ yds. struck. Dumping height is 10 ft. 9 ins. and it will dig 14 ins. below ground line. It is powered by a 66-hp crawler on a non-oscillating track frame. Control levers insure minimum operator fatigue. Forward speeds of the tractor are 1.4 to 5.8 mph. Fuel is diesel. Full data from Caterpillar Tractor Co., Peoria, Ill.

Use Coupon on page 36; circle No. 5-1

Maleic Hydrazide May Solve Your Grass Problem

For stopping temporarily the growth of grass or weeds—for as long as two months—one pound of water soluble powder is mixed with 50 gals. of water to treat one acre. A power sprayer is necessary for even control. Excellent along roadsides and in hard-to-get-to places. Mowings have been reduced from 19 to 2 per season. Naugatuck Chemical Div., Rockefeller Center, New York 20, N. Y.

Use coupon on page 36; circle No. 5-2

Portable Dryer for Preparing Asphalt Aggregates

A new portable asphalt aggregate dryer has been developed for use with the Hetherington & Berner Moto-Patcher. This dryer has a capacity of 10 tons per hour. Feeding of aggregate is by rotary elevator from a truck or by hand. The dryer drum is 30 ins. in diameter and 8 ft. long, and is mounted on a two-wheel running gear with landing wheel and hitch. It is readily attachable to any standard truck with towing hitch. Bulletin gives

Portable aggregate dryer

complete information on both the dryer and the Moto-Patcher and shows how they are used. Hetherington & Berner Inc., 700 Kentucky Ave., Indianapolis 7, Ind.

Use coupon on page 36; circle No. 5-3

Takes Old Paint off Construction Machinery

To remove paint from road-building and other construction equipment, the 61CF solution is applied hot several times, depending on the thickness of the paint coat; then the surface is sprayed with a solution of Magnus 23X from a steam gun. This removes the paint; the surface is rinsed and repainted. No fumes; 30 percent saving in time. Magnus Chemical Co., South Ave., Garwood, N. J.

Use coupon on page 36; circle No. 5-4

Leaf Pulverizer and Soil Mulcher Equals 10 Men

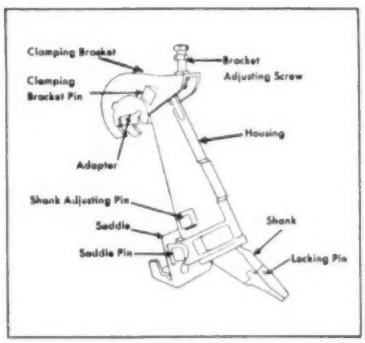
When the leaves gather later this summer, you can eliminate the problem of raking and disposing of them. The Turbo Jet can do as much as ten men. It gathers and pulverizes leaves—even picking them up from fences, shrubs and other difficult places—and returns the fine chaff to the soil as a mulch. Mounted on rubber tires; 20-inch opening. More from Turbo Jet Mfg. Co., 22 Bowman Terrace, Cincinnati 29, O.

Use coupon on page 36; circle No. 5-5

Dozer-Rooter Cuts Dozing Costs by 50 Percent

You put this dozer-rooter on your bulldozer and you have a rooter that will greatly increase your yardage and save time and money in other ways. Roots from 9 to 27 ins. deep by raising or lowering moldboard or changing depth setting on rooter. Put on or taken off quickly by one man. Rips, roots and dozes on the same pass. Ask for Bull. 194. Electric Steel Foundry Co., 2141 NW 25th, Portland, Ore.

Use coupon on page 36; circle No. 5-6



Fits on a bulldozer

Neat and legible markers

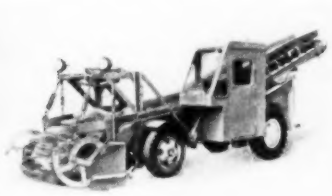
Stencils and Concrete Posts Make Street Name Markers

Concrete posts make neat and legible street name markers when the lettering on them is prepared with a Mak-A-Sign kit. Black paint or lacquer is applied with a spray gun over the stencil, or a brush can be used. Using a Mak-A-Sign kit, one man can letter forty posts on two sides in an 8-hour day. Ask for Bulletin on Kit 3 equipment which gives full data. Mak-A-Sign Co., Box 2290, Birmingham, Ala.

Use coupon on page 36; circle No. 5-7

Stockpile Loading Attachment for Athey Loader

A high-speed stockpile loading attachment has been developed by Athey for their force-feed loader. This new device is designed to permit loading from a stockpile at rates up to 10 cubic yards an hour, without any build-up in front of the wheels. This attachment is available as original equipment, or as an attachment which can be installed on loaders already in use. It is especially adapted to loading such materials as gravel, crushed stone or chemicals. Literature from Athey Products Corp., 5631 West 65th St., Chicago 38, Ill.



Loads from stockpiles

Use coupon on page 36; circle No. 5-8

Multi-Use Hydraulic Loader with Accessories

Available in six models, according to capacity, dumping height and forward reach, this new Shoveloader is furnished mounted on any of four national makes of industrial tractors: Case, Oliver, Shepherd and Minneapolis-Moline. The basic attachment is a material bucket for loading and unloading materials. Other attachments include a snow bucket, bulldozer, lifting crane, sweeper, rear leveling blade and scarifier. Design permits crowd and dig below the tractor level. Full data from Baker-Lull Corp., 314 W. 90th St., Minneapolis 20, Minn.

Baker-Lull Shoveloader

Use coupon on page 36; circle No. 5-9

Soil Reaction Tester Shows pH of Soils

Soil reaction is important to determine possible corrosive action of soils on pipes, and also for getting best growth of grass and plants. This new Hellige tester has an accurate and convenient color comparison chart which shows soil reactions from pH 4 to 9. The simple 3-step procedure is fool-proof. Hellige Soil Manual and chart of soil reaction preferences also available. Hellige, Garden City, N. Y.

Use coupon on page 36; circle No. 5-10

Coupling Shuts Off Air Pressure When Disconnected

A new two-way coupling has a valve which automatically shuts off air pressure when the air hose is disconnected.. This speeds up work because it is not necessary to open and close air valves when about to change air tools. Valves and seats are brass. Underwater tests at 125 psi show no leakage. Valves do not reduce efficiency. Literature from Twinmatic Corp., 2246 So. Barrington Ave., Los Angeles 64, Calif.

Use coupon on page 36; circle No. 5-11

Even a blindfolded ditching or excavating machine operator will find the pipe —when he breaks it! . . . To be safe, use the efficient, economical Detectron "505." It finds the pipes and cables first—with speed, pinpoint accuracy, greater depth and positive location . . . Throw away the blindfold—get a new, improved "505" . . . you'll never regret it!

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Write for Bulletin No. 14

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Inserting Valves and Equipment for Their Use

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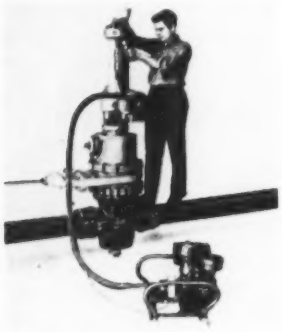


Inserts valves.

any existing line. It is especially valuable where additional valving is required but shut-down of the line is impractical or hazardous. Mechanism of the valve is identical with Mueller AWWA gate valves. Any of the several Mueller drilling machines may be used as a primary unit. More data from Mueller Co., Decatur, Ill.

Use coupon on page 36; circle No. 5-12

• • •

Meter Spreader Saves Time in Installing Meters

This ingenious tool can save a great deal of time when installing or changing meters. By means of a hand wheel, a threaded stem and a toggle joint, the meter connections are spread so that disconnection is quick and easy. One tool handles ⅝, ¾ and 1-inch meters without adjustment. Full data from the R. & H. Meter Base Spreader Co., PO Box 613, Cedartown, Georgia.

Use coupon on page 36; circle No. 5-13

Septic Tank Guaranteed for Twenty Years

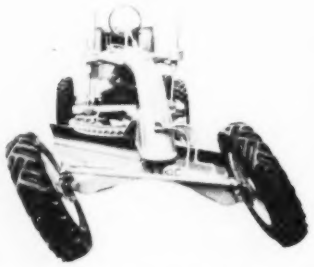
The San-Equip septic tanks have always been excellent; now each of the "Master" tanks carries a guarantee against corrosion or structural failure for 20 years. This is a well-designed horizontal tank made in 300, 500 and 600-gal. sizes. "Senior" tanks are vertical. These tanks, also with a 20-year guarantee, are made in 300, 500, 600 and 750-gal. sizes. Data from San-Equip, Inc., Syracuse, N. Y.

Use coupon on page 36; circle No. 5-14

• • •

Greater Motor Grader Versatility

Front-wheel-lean and power-circle-turn are now provided as optional equipment on the Allis-Chalmers 40-hp, 8800-pound tan-



What this grader will do.

dem-drive Model D motor grader. The wheel-lean has a range of 25° each way, giving ample tilt for ditching and for counteracting side draft. The circle-turn provides control through 135° and embodies a number of interesting features. Fuller data on these and other improvements for the Model D from Tractor Division, Allis-Chalmers Mfg. Co., Milwaukee 1, Wisc.

Use coupon on page 36; circle No. 5-15

Portable Power-Driven Post-Hole Digger

For digging holes for sign posts, guard rail posts and doing many other similar jobs, this power-

The easy way to do it.

driven post hole digger will save lots of money. It operates with any air drill with standard Jacobs chuck or with any half-inch or larger electric drill (500 rpm or less, 7 amps or less) or from a 1.5-kw portable AC or DC generator. Digs 6-inch hole 3 ft. deep in one minute. Shaft extension permits deeper holes. Eugene John Freeman & Co., PO Box 2143, Van Nuys, Calif.

Use coupon on page 36; circle No. 5-16

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Concrete Gun Places Up to 5 Cu. Yds. An Hour

This concrete gun handles one to five cu. yds. per hour or about 1¼ yds. per 100 cfm of air. It handles materials dry or up to 60 percent moisture; also all cementitious materials for construction, refractory materials and many light weight aggregates. Used for swimming pools, ditch lining, surfacing, etc. Blastcrete Equip. Co., Inc., 11154 Santa Monica Blvd., Los Angeles 25, Calif.

Use coupon on page 36; circle No. 5-17

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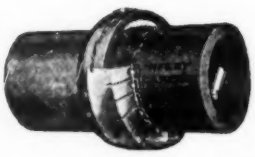
GASKETS and FORMS
for
SEWER PIPE JOINTS
(a cement joint)



● No jute used—gasket centers spigot. ● Definite space in each joint for cement. ● Form confines cement-grout to lower portion of joint. ● Particularly advantageous in water-bearing trenches. ● Infiltration minimized.

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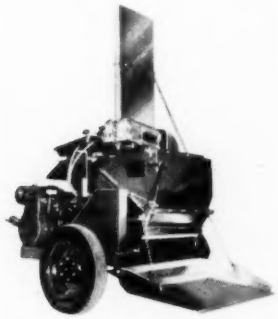

Patching mixer.

will reactivate and heat stock pile mixtures up to 10 tons per hour; prepare cold asphaltic mixtures up to 10 tons an hour; prepare hot asphaltic mixes up to 5 tons an hour; dry aggregates; and process tars, paving asphalts, cutbacks and emulsions. Ask about the HTD-B Multi-Pug. K. E. McConnaughay, Lafayette, Ind.

Use coupon on page 36; circle No. 5-18

• • •

Magnetic Road Sweeper Picks up Metals

Tacks, nails and tramp iron can be picked up from highways, parking lots and airports by this new but efficient unit. It comes in four widths, 24 to 60 ins. Can be pushed by hand or pulled by a truck. Rubber tires are puncture proof. Heavy-duty models operate up to 10 mph. Cleaning is easy by turning the magnetic face upward. More data from Eriez Manufacturing Co., Erie, Pa.

Use coupon on page 36; circle No. 5-19

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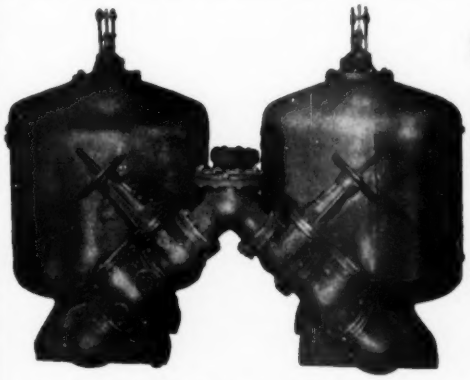
An Easy Way to Get Your Air-Entrained Concrete

A Vinsol Resin solution is available to add to the concrete at the mixer to entrain the correct percentage of air. Using normal gray portland cement, 2 to 2½ oz. is added per bag of cement; with air-entraining cement, use half an ounce per bag. Concrete is more workable, durable and easily handled. We believe you can get a gallon sample by writing Davies-Young Soap Co., Box 995, Dayton 1, Ohio.

Use coupon on page 36; circle No. 5-20

WHEN IT'S TIME FOR A CHANGE—
Make it for the BEST, to rugged



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Portable Dryer Useful in Many Fields of Work

With a capacity of 8 tons per hour, this highly portable rotary dryer has many uses in the municipal field, including the handling of aggregates, sand and cinders, whether frozen or wet. Mounting

Barber-Greene Dryall

is on a rubber-tired chassis; power is by an air-cooled gasoline engine. The skip in loading position is only 14 ins. above ground level, thus simplifying the work of charging. Fine for heating and drying frozen aggregates for concrete or paving work; and for frozen stockpiles of sand or cinders. More from Barber-Greene Co., 400 N. Highland Ave., Aurora, Ill.

Use coupon on page 36; circle No. 5-21

• • •

Small Ion Exchange Unit for Water Decontamination

This is a simple small unit utilizing ion exchange for removing metals, acids and other impurities from water. Six sizes are available, having capacities from 60 gallons per hour to 520 gallons. By using an accessory tube, spent resin may be regenerated. Designed for laboratory and pilot plant operation. Reactor Division, Enley Products, Inc., 254 Pearl St., New York 38, N.Y.

Use coupon on page 36; circle No. 5-22

• • •

New Speed Graders Available in Five Sizes

Five sizes of the new Pettibone-Mulliken graders are now available. These are 65 hp, 83 hp, two models of 100.2 hp and the 107.8 hp—the latter claimed to be the world's largest motor grader. These graders include many new features, among which are shock-proof hydraulic control, power steering, a very strong frame and large front wheels, with front and rear interchangeable. Fuller data available from Pettibone-Mulliken Corp., 4700 West Division St., Chicago, Ill.

New Motor Grader

Use coupon on page 36; circle No. 5-23

• • •

Four Swimming Pools Proposed for Huntington

In order to provide equal facilities for all races, creeds and colors, Huntington, West Va., is considering the construction of four modern swimming pools in various sections of the city. Miles O. Sherrill, Louisville, Ky., is consultant on this project and has prepared a comprehensive report. Other projects now being handled by Mr. Sherrill include water works and sewage disposal for South Point, O.; complete water works and treatment plant for Hardin Co. Water District No. 1, Radcliff, Ky.; and a rate structure report for Bowling Green, Ky.

• • •

M. J. Shelton Honored

M. J. Shelton, General Manager and Chief Engineer of the La Mesa, Lemon Grove and Spring Valley Irrigation District, has been appointed a member of the California State Water Pollution Board, succeeding G. E. Arnold now in charge of the Philadelphia Water Department.

ASSOCIATIONS

The next meeting of the New York State Sewage and Industrial Wastes Association will be held at the Hotel Sheraton, Rochester, N. Y., June 8 and 9. The next annual meeting will be at the Hotel New Yorker, New York City, Jan. 21 and 22, 1954. Ralph C. Sweeney, 21 North Broadway, White Plains, N. Y., is Secretary.

The Western Canada Water and Sewage Conference's annual meeting will be held at Edmonton, Alberta, Sept. 23 to 25, at the Macdonald Hotel. Data from W. J. Waddell, 617 7th Ave. East, Calgary, Alta.

The Ohio Section of the AWWA will hold its meeting at Cleveland, O., Sept. 9 to 11.

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TOPS FOR SPOT pH, CHLORINE TESTS

Taylor Model T-O Comparator. Slides for pH as low as 0.2 or as high as 13.6.

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Fig. II Stadia hair arrangement for our standard transits.

Fig. III Special stadia hair arrangement, furnished upon request.

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Worth Telling

by Arthur K. Akers

★ **AT CONTINENTAL STEEL CORPORATION,** leading fence manufacturers, Kokomo, Ind., HOWARD C. WILLIAMS has been elevated to general sales manager. F. A. LEWIS at the same time became sales manager of the Merchant Trade Division.

★ **UNITED STATES PIPE & FOUNDRY COMPANY** promotions, effective July 1 next are: J. LESLIE HART, from western sales manager in Chicago to

Mr. Hart

Mr. Farrington

eastern sales manager in Burlington, N. J.; P. KING FARRINGTON, now assistant Pacific Coast sales manager, replaces Mr. Hart in Chicago.

★ **"DUMP BODY BUSINESS"** is the newest publication in the dump body and hoist field. It will appear bi-monthly and if you lack yours we are sure the MARION METAL PRODUCTS COMPANY, Marion, Ohio, can be approached about adding you to its readership.

★ **NICK POPA,** better known to us in BYER & BOWMAN advertising agency, Columbus, authors a booklet on the care and training of caddies, to make them better caddies for your club. A quarter to him at 331 W. South St., Worthington, Ohio, brings yours.

★ **INVITATIONS** we would like to have accepted: one from President JULIEN R. STEELMAN of KOEHRING COMPANY, Milwaukee, to the opening on April 17th of their KOEHRING SOUTHERN COMPANY plant in Chattanooga. "Cocktails at 6:15" added to the regret in our regrets.

★ **NORTON COMPANY'S** New York City domestic sales offices (abrasives division) have moved to their BEHR-MANNING affiliate's warehouse in Teterboro, N. J.

★ **GILBERT C. STREGE** becomes the new president of the BAKER-LULL CORPORATION, Minneapolis, a newly acquired subsidiary of THE BAKER-RAULANG COMPANY, Cleveland, producers of lift trucks, cranes and tractors.

★ **W. A. RIDDELL CORPORATION,** Bucyrus, Ohio, has named ANDREW WINTERS as factory representative in seven southwestern states, with headquarters in Dallas.

★ **NATCO** is the new corporate name of NATIONAL FIREPROOFING CORPORATION, Pittsburgh, Everything and everybody else there remains the same.

★ **YEOMANS BROTHERS,** Melrose Park (Chicago), manufacturers of sewage treatment equipment, announce CHARLES YEOMANS elected chairman of the board, D. W. BURGOON.

Mr. Burgoon

Mr. Norris

president, and S. A. NORRIS, sales manager, pump division.

★ **LLOYD E. FLANDERS** is the new sales and advertising head of MAGINNIS POWER TOOL COMPANY (concrete vibrators) at Mansfield, Ohio.

★ **LOCK JOINT PIPE COMPANY'S** April "Pipeline" internal house organ is a credit to Advertising Manager Louis Seton—text, pictures, cartoons, and all.

★ **A GENEROUS TIPPER** in a Memphis hotel, finding a new waiter serving him, asked: "Where's Mose, my regular waiter?" The answer, "Boss, Mose ain't servin' you no more. I won you in a crap game on Beale Street last night."

—*Coarse Screenings,* N. D.

test after test assures the best

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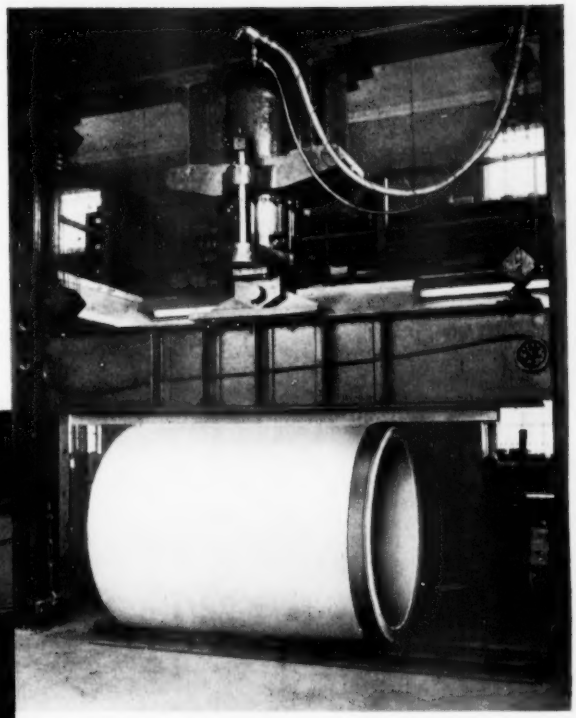

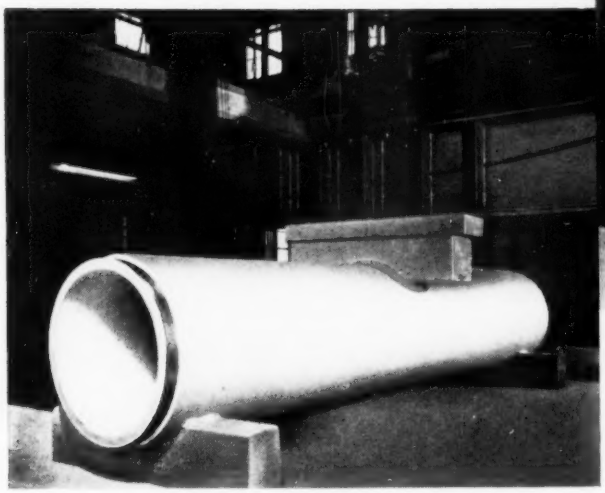

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Do you have conclusive proof of the fundamental characteristics of the pipe you intend using in your next water works project? Are you certain of its advantages? Do you recognize its limitations?

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In Lock Joint's laboratory at Wharton, N. J. all guess work has been eliminated. Here, Lock Joint Pipes of all types and designs are tested to determine the exact extent of their ability to withstand back loads, beam loads and internal pressures. The most efficient modern equipment in the hands of highly trained personnel is used to give a tangible, practical demonstration of the high quality built into every type of Lock Joint Pipe.

• • •

These constant tests of our products are your assurance that, in its field, no finer pressure pipe than Lock Joint can be produced. Built in diameters from 16" upward and designed for any pressure common to water works practice, these pipes will serve you unfailingly for generations.

SCOPE OF SERVICES: *Lock Joint Pipe Company specializes in the manufacture and installation of Reinforced Concrete Pressure Pipe for Water Supply and Distribution Mains 16" in diameter or larger, as well as Concrete Pipes of all types for Sanitary Sewers, Storm Drains, Culverts and Subaqueous Lines.*

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Established 1905

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Hundreds of installations feeding waterworks chemicals, industrial chemicals and feed and flour ingredients have proved the accuracy and dependability of these belt type gravimetric feeders.

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